Environment and Social Psychology (2025) Volume 10 Issue 12 ISSN: 2424-8975 (O)
doi: 10.59429/esp.v10i12.4115 2424-7979 (P)

RESEARCH ARTICLE

From traditional to digital: The role of smart streaming television in shaping media consumption habits of rural elderly in China

MENGHUAN WU[1] , NURUL HIJJA MAZLAN[2,*], NUR NASLIZA ARINA BINTI MOHAMAD NASIR[3], WARDATUL HAYAT ADNAN[4]

[1]*Faculty of Communication and Media Studies, Universiti Teknologi MARA (UiTM), 40450 Shah Alam, Selangor Darul Ehsan, Malaysia*

[2]*Department of Computer Sciences, Faculty of Computer and Mathematical Sciences, Universiti Teknologi MARA (UiTM), 40450 Shah Alam, Selangor Darul Ehsan, Malaysia*

[3]*Faculty of Communication and Media Studies, Universiti Teknologi MARA (UiTM),Cawangan Melaka Kampus Jasin,77300 Merlimau, Melaka Malaysia*

[4]*Faculty of Communication and Media Studies,Universiti Teknologi MARA (UiTM),40450 Shah Alam, Selangor Malaysia*

*** Corresponding author:** NURUL HIJJA MAZLAN, nurulhijja@uitm.edu.my

ABSTRACT

Smart streaming television represents a potential bridge between traditional and digital media for elderly populations, yet its adoption and impact remain understudied in rural contexts. This mixed-methods study investigated smart TV adoption patterns and media consumption changes among 342 rural elderly participants in Shandong Province, China. Quantitative surveys assessed technology ownership, digital literacy, and usage patterns, while qualitative interviews with 48 participants explored adoption experiences and barriers.Results revealed 63.5% smart TV ownership with varied usage patterns: 49.1% actively used digital features, 14.4% used devices as traditional TV replacements, and 5.3% owned but never activated smart TVs, indicating significant adoption-usage gaps. Structural equation modeling identified perceived usefulness (β=0.52), social influence (β=0.43), and family support (β=0.38) as primary adoption facilitators. Major barriers included technical complexity (76.8% of non-adopters), limited digital literacy (basic navigation proficiency ranging from 64% to 24% across age groups), economic constraints, and infrastructure limitations affecting 43.2% of villages. Among active users, media consumption transformed significantly. Daily viewing increased from 4.2 to 6.0 hours, active content selection rose from 12.5% to 78.6%, and family co-viewing grew by 58.0%. Health program viewership increased 157.6%, while traditional opera consumption rose 117.5%. However, traditional viewing habits persisted alongside digital adoption, suggesting complementary rather than replacement relationships. These findings indicate that smart TV adoption among rural elderly involves complex negotiations between technological opportunities and contextual constraints. Successful integration requires user-centered design, sustained family support, infrastructure development, and content curation aligned with elderly users' cultural preferences. The study contributes to understanding digital inclusion challenges and opportunities for aging populations in rapidly digitalizing societies.

Keywords: rural elderly; smart streaming television; digital divide; media consumption habits; technology adoption; digital inclusion

1. Introduction

The rapid digitalization of contemporary society has fundamentally transformed media consumption patterns across all demographic groups. Nevertheless, such transition may face the challenges of identity construction of the rural elderly, especially in developing countries such as China. In the context of an aging population and rapid technological development, elderly people in rural China are now in a sensitive position during the transition from traditional to digital media. The paper analyzes the effects of smart streaming TV on media consumption habits of the elderly in rural China, filling in the gaps of current digital exclusion research.

China's demographic landscape reveals striking disparities in digital adoption between urban and rural areas. With more than 280 million aged people in China, it has been challenged by not only rapid aging but also the maldevelopment of urban-rural digital divides[1]. The Internet penetration rate in rural China has reached 55.9%, but older adults are still confronted with difficulties in adopting digital technology in their life[2]. The rural elderly suffer from the duality of economic poverty and lower educational level, and their access to digital infrastructure is also limited, leading to not just constraints on access but also creating, in the eyes of researchers, a "psychological digital divide"[3].

But the arrival of smart streaming television is a technology that could help close that gap. Unlike phone-like smartphones or computer-like PCs, smart TVs allow the content marketplace to leverage existing UI paradigms while introducing digital functionality. This technological progress takes place within a larger context of China’s Digital Village Strategy that seeks to revamp rural areas through better connectivity and digital services[4]. But the utilization of these technologies among rural elders is not only inadequate, but also lacks clear explanations.

However, the mere presence of smart TV technology does not guarantee its utilization as a full-scale digital device. Rural elderly users may employ smart TVs primarily as traditional television replacements, accessing only basic broadcast functions while leaving advanced digital features unused. This distinction between smart TV ownership and comprehensive digital engagement represents a critical gap in understanding elderly technology adoption patterns.

New forms of research are now concentrating on digital inclusion and older people and are indicating a mixed picture of uptake and rejection. Li & Kostka show that there are some differences in rural levels of digital exclusion between older men and women, which speaks to the gendered intersection of the digital divide[5]. Similarly, Cui et al. underline how cultural capital, cognitive ability, and economic resources

ARTICLE INFO
Received: 01 September 2025 | Accepted: 30 September 2025 | Available online: 26 December 2025

CITATION
Wu MH, MAZLAN NH, NASIR NNABM,et.al. From traditional to digital: The role of smart streaming television in shaping media consumption habits of rural elderly in China. *Environment and Social Psychology* 2025; 10(12): 4115 doi:10.59429/esp.v10i12.4115

jointly impact the use of digital technology among the rural elderly[6]. These results indicate that the issue of access may be only one dimension of technology adoption and that other, more encompassing social, cultural, and psychological changes may be at stake.

Much attention has been devoted to the health and social consequences of the adoption of digital technology by the elderly. Research has confirmed that improved digital literacy directly correlates with enhanced health behaviors among rural elderly, including increased health knowledge acquisition and engagement in fitness activities [7]. Furthermore, digital media engagement, particularly through social platforms, significantly impacts social participation levels among Chinese elderly populations [8].

A number of theoretical models have been proposed to explain the patterns of adoption of technology in populations of the elderly. The Technology Acceptance Model (TAM) and its periphery, such as the Senior Technology Acceptance Model (STAM), argue for the importance of the perceived usefulness and ease of use for users intending to adopt[9]. The Unified Theory of Acceptance and Use of Technology (UTAUT) also extends this model by including social influence and facilitating conditions[10]. Second, Uses and Gratifications Theory may provide valuable information on how the elderly actively choose media to satisfy certain needs with different tones from information seeking, socializing, etc.[11].

However, these theoretical models were primarily developed for younger populations in developed contexts and may not adequately capture the social embeddedness of technology adoption among rural elderly in collectivist societies. This study integrates TAM's core constructs with UTAUT's social influence factors and Uses and Gratifications motivations to develop a contextually appropriate framework for understanding smart TV adoption among Chinese rural elderly, as illustrated in **Figure 1**. The framework recognizes that elderly users' technology decisions occur within family networks where perceived usefulness, social support, and cultural content preferences interact to shape both adoption and usage patterns.

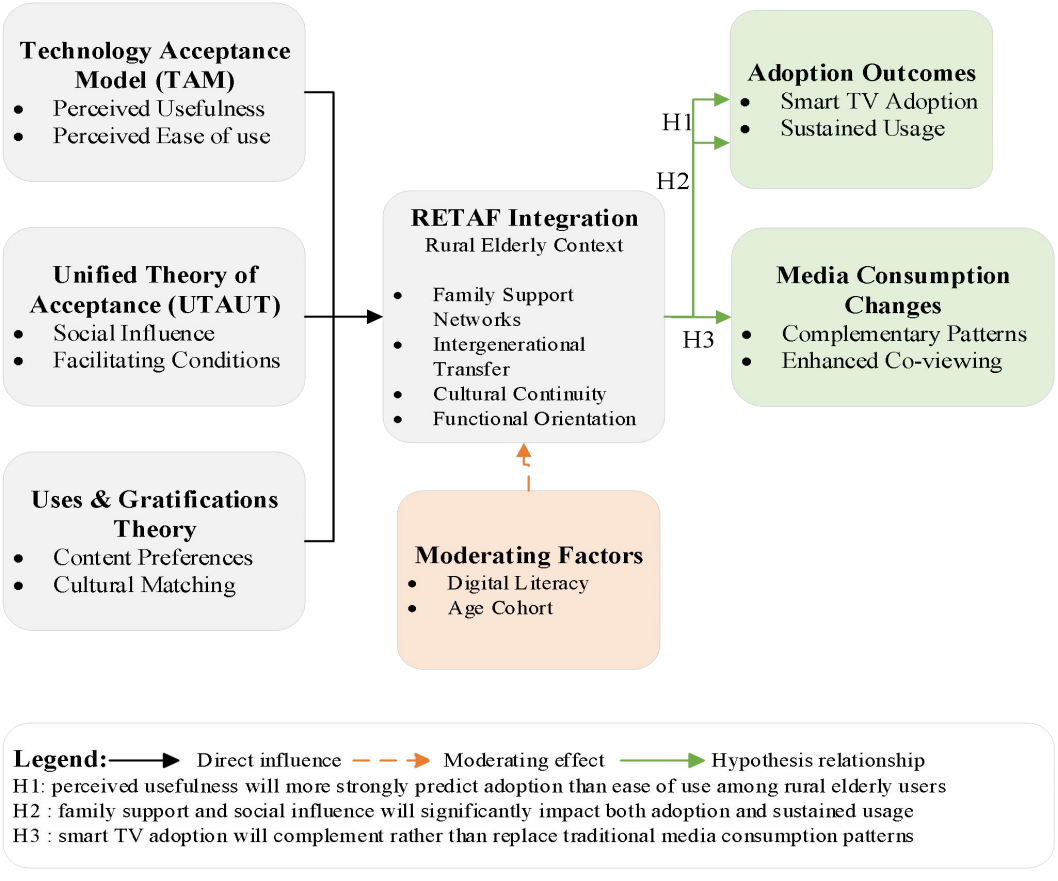

Figure 1. Conceptual framework for rural elderly technology adoption: Integration of TAM, UTAUT, and uses and gratifications theory.

Based on this integrated framework, the study tests three key hypotheses: (H1) perceived usefulness will more strongly predict adoption than ease of use among rural elderly users; (H2) family support and social influence will significantly impact both adoption and sustained usage; and (H3) smart TV adoption will complement rather than replace traditional media consumption patterns.

The use of theoretical underpinnings in the adoption of smart streaming television poses specific questions. Research demonstrates that intergenerational technology support plays a crucial role in elderly technology adoption, suggesting that family dynamics significantly influence digital inclusion outcomes[12]. Similarly, family intergenerational learning can effectively bridge the digital divide for rural elderly populations, emphasizing the importance of social support systems in technology adoption processes[13]. Yet, understanding of the impact of smart streaming television on media consumption patterns of rural older adults is limited. Existing research provides ample understanding of smartphone and internet adoption; however, the peculiar characteristics of smart TV technology, such as its embedded nature within traditional media utilization and its potential for usable interfaces, are under-investigated. In addition, rural China has its unique social structures and underdeveloped technology that need purposeful exploration.

This paper aims to fill these research gaps by exploring the effects of smart streaming television subscription on media use among the rural elderly in China. The studies aim at the investigation of both the technically oriented adoption of the medium and the larger social, cultural, and psychological background of elderly people's usage of digital media technologies. Combining different theoretical approaches, above all focusing on the rural context in China, this study contributes to the theoretical level as well as to the practical level for promoting digital inclusion among underserved communities. The implications of this study are beyond the academic sphere. It is becoming increasingly important to ensure accessibility and utility of Internet and digital engagement for social integration and the well-being of the elderly as China is in a process of digitalization. How smart streaming television can provide a bridge from traditional to digital media consumption is of interest not only to policymakers and technology developers but also to social service professionals seeking to foster inclusive digitalization. This study of the village therefore speaks to immediate practical issues as well as to more general questions about technology, aging, and social change in China today.

2. Method

2.1. Research design and participants

This study employed a mixed-methods approach to investigate the impact of smart streaming television on media consumption among rural elderly in China. The research design combined asynchronous online quantitative surveys and synchronous online interviews, exploring for a coverage and depth view of old users in the digital media innovation. This methodology choice is consistent with the recent attention to researching technology adoption by the elderly, suggesting the necessity of understanding not only behavioral patterns but also underlying motivations[14,15].

The study was conducted in three rural villages in Shandong province that were chosen to represent different degrees of development of digital infrastructure and demographic profile. The choice of locations took into account criteria such as internet penetration levels, distribution of smart TV services, and percentage of elderly populace. Such stratified sampling allows for diversity from various stages of digital development to be covered, characterizing the heterogeneity of the digital transition of rural China. The

theoretical framework guided sampling and measurement design. Villages were selected to represent varying digital infrastructure levels, reflecting facilitating conditions from UTAUT. Instruments combined validated TAM scales adapted for smart TV contexts, UTAUT social influence measures modified for Chinese family structures, and media consumption indicators aligned with gratifications sought by elderly users. They were obtained with the assistance of village committees and local associations of the elderly. Eligible participants were oriented adults (≥60 years) resident in the selected villages for at least five years who were exposed to or aware of smart streaming television (TV) technology. Of the total sample, 342 elderly participants were retained for the quantitative phase and 48 participants were included for the qualitative phase. **Table 1** presents the detailed demographic profiles for the sample obtained and indicates a fairly even distribution of sex and variations in educational level, common with the elderly in rural areas.

Table 1. Demographic characteristics of study participants (N = 342).

Characteristic	Category	N (%)
Gender		
	Male	186 (54.4%)
	Female	156 (45.6%)
Age Group		
	60-65	124 (36.3%)
	66-70	98 (28.7%)
	71-75	72 (21.1%)
	76+	48 (14.0%)
Education Level		
	No formal education	89 (26.0%)
	Primary school	178 (52.0%)
	Middle school or above	75 (22.0%)
Smart TV Access		
	Has access	217 (63.5%)
	No access	125 (36.5%)
Living Arrangement		
	Living alone	67 (19.6%)
	With spouse only	148 (43.3%)
	With children/grandchildren	127 (37.1%)

2.2. Data collection

Data were collected at two consecutive times from March to August 2024. Recognizing that smart TV ownership does not equate to digital device usage, the study distinguished between basic television replacement usage and advanced digital functionality engagement. Participants were categorized into three usage levels: (1) non-users (ownership without activation), (2) basic users (traditional TV functions only), and (3) digital users (utilizing streaming, on-demand, and interactive features). This classification addressed the assumption that all smart TV owners engage with digital capabilities. The quantitative phase involved the

structures, where structured questionnaires based on known technology acceptance scales were used. The questionnaire adapted validated instruments from the Technology Acceptance Model (perceived usefulness and perceived ease of use scales)[16] together with specific context-related items regarding the media consumption of rural elderly.

For analytical clarity, this study categorizes smart TV owners into three distinct user types: (1) digital users - participants who actively utilize streaming, on-demand, and interactive features (n=168, 49.1%); (2) basic users - those who use smart TVs solely for traditional broadcast viewing (n=31, 14.4%); and (3) non-users - owners who never activated their devices (n=18, 5.3%). This classification enables precise analysis of technology engagement levels rather than treating ownership as uniform adoption.

Further scales assessed digital literacy, the availability of social support, and the use of traditional media following instruments validated in prior studies with Chinese older adults [17]. The survey was designed for individuals with different literacy levels to respond; thus, survey interviews were done in person by trained researchers who were familiar with local dialects. This technique targeted obstacles of visual impairment or reading challenges, which are prevalent in older adults.

Every survey took about 45 to 60 minutes; participants were also given breaks to avoid fatigue. Research assistants received extensive training for survey procedures and ethical concerns with the elderly. The study design framework is presented in **Figure 2**, indicating quantitative and qualitative phases undertaken from March to August 2024. In the quantitative phase, 342 participants completed structured questionnaires, while in the qualitative phase, 48 selected participants were interviewed in depth, and data triangulation was used for data integration.

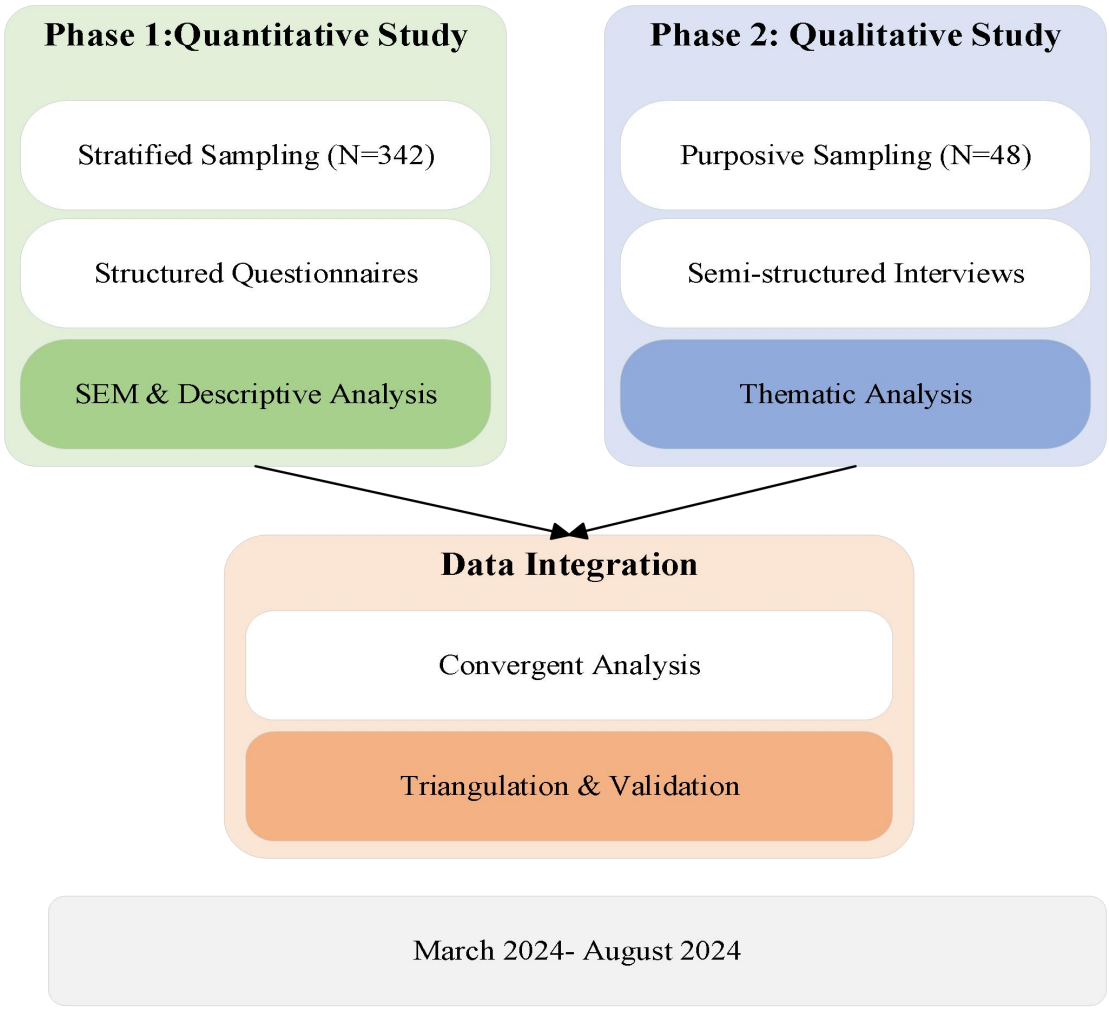

Figure 2. Mixed-methods research design framework.

The qualitative phase involved semi-structured interviews with a purposively selected subsample of 48 participants, representing different adoption stages and demographic profiles. Interview participants were selected based on maximum variation sampling to ensure diverse perspectives across age groups, gender, education levels, and smart TV adoption status. The interview protocol explored themes including daily media consumption routines, perceived benefits and challenges of smart TV adoption, family dynamics in technology use, and comparisons between traditional and digital media experiences. Interviews were conducted in participants' homes to provide a comfortable environment and enable observation of actual media use contexts.

2.3. Data analysis

Quantitative data analysis employed multiple statistical techniques using SPSS 26.0. Descriptive statistics characterized the sample and identified patterns in smart TV adoption and media consumption behaviors. Chi-square tests examined associations between demographic variables and adoption status. Structural equation modeling tested relationships between technology acceptance factors, social support variables, and adoption outcomes, following established procedures for technology adoption research among elderly populations[18].

Qualitative data underwent thematic analysis following Braun and Clarke's six-phase framework. Interview transcripts were first transcribed verbatim in Chinese, then coded inductively to identify emerging themes related to smart TV adoption experiences and media consumption transformations. Two researchers independently coded a subset of transcripts to establish inter-rater reliability, achieving a Cohen's kappa of 0.84, indicating substantial agreement. NVivo 12 software facilitated data management and analysis processes.

Integration of quantitative and qualitative findings occurred through a convergent mixed-methods approach. Quantitative results provided broad patterns of adoption and usage, while qualitative findings offered explanatory insights into the mechanisms and contexts shaping these patterns. This integrated analysis enabled a comprehensive understanding of how smart streaming television influences media consumption habits among rural elderly populations, addressing both the extent and nature of behavioral changes. The mixed-methods approach allowed for triangulation of findings, enhancing the validity and reliability of research conclusions.

3. Results

3.1. Participant characteristics

The demographic analysis of 342 rural elderly participants revealed substantial heterogeneity across key variables influencing smart streaming television adoption. Age distribution demonstrated a gradual decline in participation rates with advancing age: 36.3% (n=124) aged 60-65 years, 28.7% (n=98) aged 66-70 years, 21.1% (n=72) aged 71-75 years, and 14.0% (n=48) aged 76 years or above. Educational attainment emerged as a fundamental differentiator, with 52.0% completing primary education, 26.0% reporting no formal schooling, and 22.0% achieving middle school education or beyond.

Living arrangements significantly influenced technology exposure and support availability. Among participants, 43.3% resided with spouses only, 37.1% lived in multigenerational households, and 19.6% lived alone. Smart TV access demonstrated considerable variation, with 63.5% reporting household access while 36.5% lacked such technology. Critically, among the 217 participants with smart TV access, usage patterns revealed significant variation in digital engagement levels. Analysis identified three distinct user categories: 168 participants (49.1%) actively utilized smart TV digital features including streaming and on-demand services, 31 participants (14.4%) used devices solely as traditional TV replacements accessing only broadcast channels, and 18 participants (5.3%) owned but never activated their smart TVs. This usage segmentation challenges assumptions about uniform digital adoption among smart TV owners and highlights the distinction between ownership and meaningful digital engagement. **Figure 3** illustrates the relationship between demographic characteristics and smart TV adoption rates, revealing that multigenerational households demonstrated adoption rates of 78.7% compared to 52.4% among solitary elderly residents in the youngest age cohort.

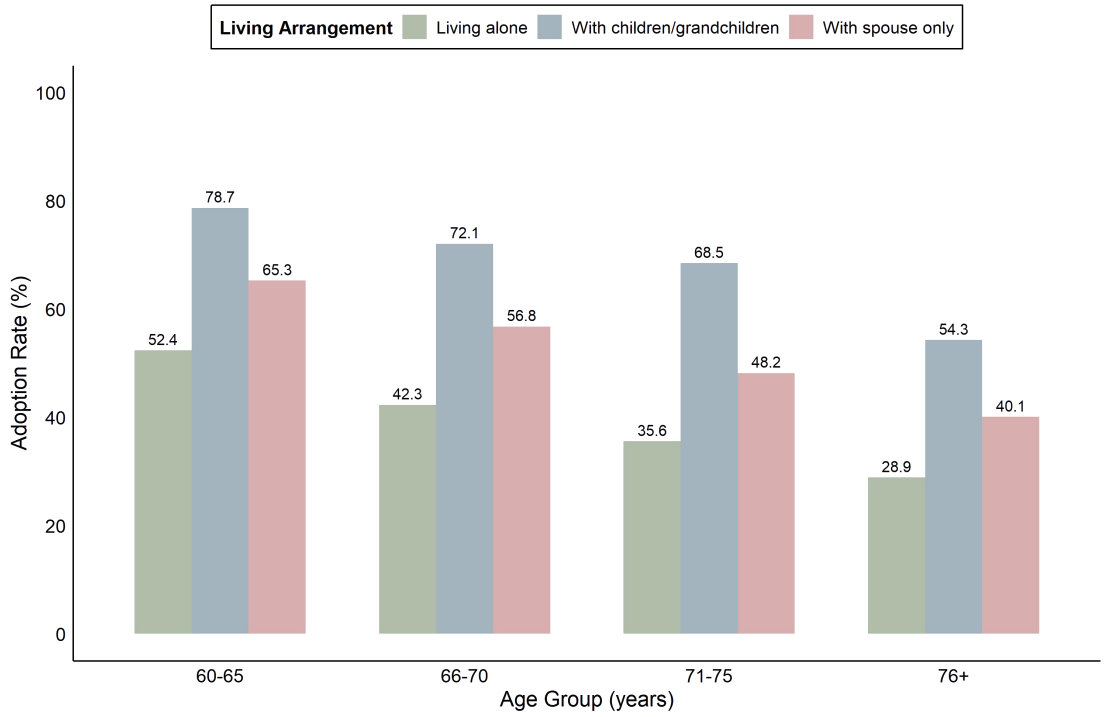

Figure 3. Smart TV adoption rates by age group and living arrangement.

Technology ownership patterns revealed a clear hierarchy of adoption, as shown in **Table 2**. Traditional devices maintained dominance while smart technologies showed selective penetration. Television ownership remained nearly universal at 95.9%, while smart TV reached 63.5% penetration, suggesting a transitional phase in media technology adoption.

Table 2. Technology ownership and usage patterns among rural elderly participants.

Technology Type	Ownership n (%)	Daily Usage n (%)	Primary Purpose
Traditional TV	328 (95.9%)	312 (91.2%)	Entertainment, News
Basic Mobile Phone	299 (87.4%)	276 (80.7%)	Communication
Smartphone	200 (58.5%)	142 (41.5%)	Communication, Entertainment
Smart TV	217 (63.5%)	168 (49.1%)	Entertainment, Information
Computer/Laptop	34 (9.9%)	12 (3.5%)	Rarely used
Internet Access	210 (61.4%)	156 (45.6%)	Various

Monthly household income revealed economic constraints potentially limiting technology adoption. Income distribution showed 31.3% earning below 2,000 RMB, 45.6% between 2,000-3,999 RMB, and 23.1% exceeding 4,000 RMB. These economic realities shaped technology access possibilities, with many participants viewing smart TV services as non-essential luxuries beyond their financial reach.

3.2. Promoting factors for smart streaming television adoption

Structural equation modeling analysis revealed multiple facilitating factors driving smart TV adoption among rural elderly populations. Perceived usefulness emerged as the strongest predictor ($\beta=0.52$, $p<0.001$), with participants identifying specific benefits including access to health programs (78.3%), traditional opera performances (72.5%), and flexible viewing schedules (69.8%). The ability to pause and replay content

proved particularly valuable for elderly viewers experiencing attention fluctuations or interrupted viewing sessions.

Figure 4 presents the standardized path coefficients for key factors influencing smart TV adoption. Social influence demonstrated substantial impact (β=0.43, p<0.001), manifesting through multiple channels. Family recommendations motivated 81.6% of adopters, while peer influence within village communities created adoption clusters where successful usage by neighbors encouraged others to overcome initial hesitation.

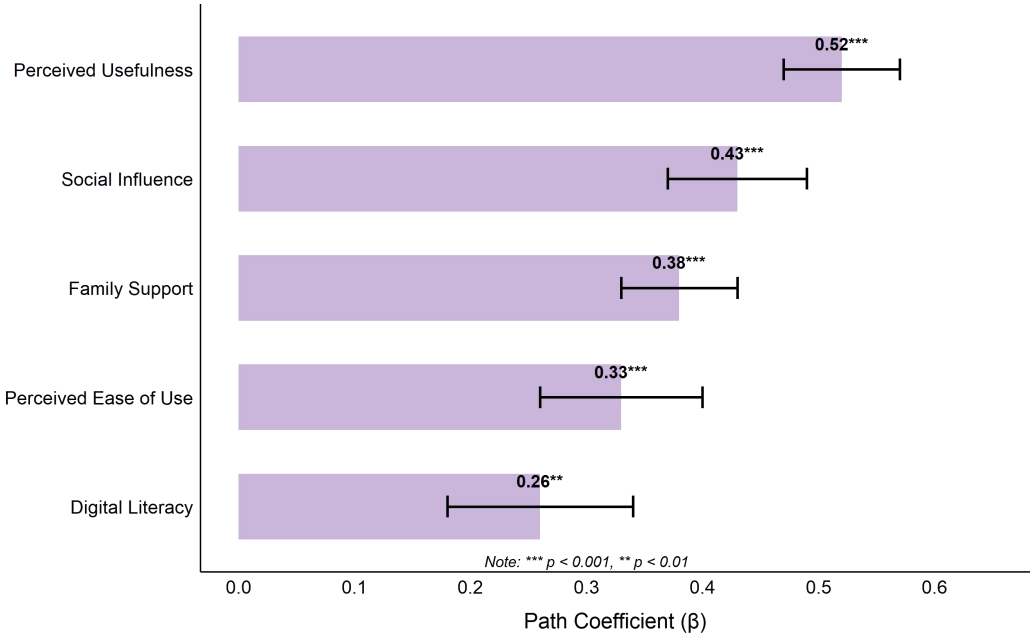

Figure 4. Standardized path coefficients for smart TV adoption factors.

Family supports were found to significantly contribute to consistent adoption (β=0.38, p<0.001). The majority of adult children who lived in cities would buy smart TVs as a gift and not provide training until they visited. Grandkids turned into unofficial technology ambassadors, walking their grandparents through simple functions with patience. Inter-generational knowledge exchange covered technical and psychological resistance at one and the same time.

Health considerations drove adoption for 64.3% who had an interest in traditional Chinese medicine programs and age-based exercise videos. Entertainment variety appealed to 71.4% of adopters, especially viewers hungry for regional opera and culturally specific programming not offered by traditional broadcast. Financial benefits were identified in the free access to content and reducing their need to buy DVDs or visit the cinema in order to include the smart TV in their home despite being an initial investment. These findings support H1, with perceived usefulness (β=0.52) substantially outweighing ease of use in adoption decisions. This pattern reflects elderly users' focus on functional benefits rather than interface simplicity, diverging from traditional TAM applications. The strong social influence effects (β=0.43) validate H2, demonstrating that rural elderly adoption occurs through family-mediated processes where adult children and grandchildren serve as technological intermediaries rather than individual decision-making.

3.3. Barriers to smart streaming television adoption

Even though there were assisting forces, there were many barriers that prevented smart TV from becoming widely acquired. The main barrier was technical complexity; 76.8% of non-adopters reported operational complexity. Whereas menu systems optimized for their younger customers simply overwhelmed users with excessive menu layers, tiny text, and a timeout rationale.

The complexity of the remote control, which had many buttons with uncertain functions, hampered elderly subjects as they were afraid to play with it for fear of making mistakes. The barriers to the use of digital literacy created an enormous challenge for attempts at adoption. Test results showed severe problems for all age groups, shown in Figure 5. Basic navigation skills showed the highest proficiency at 64% among the youngest elderly cohort, declining to 24% in the 76+ age group. More advanced activities like app management and troubleshooting saw even more dramatic age-related decline, with fewer than 20% of the elderly being proficient in those areas.

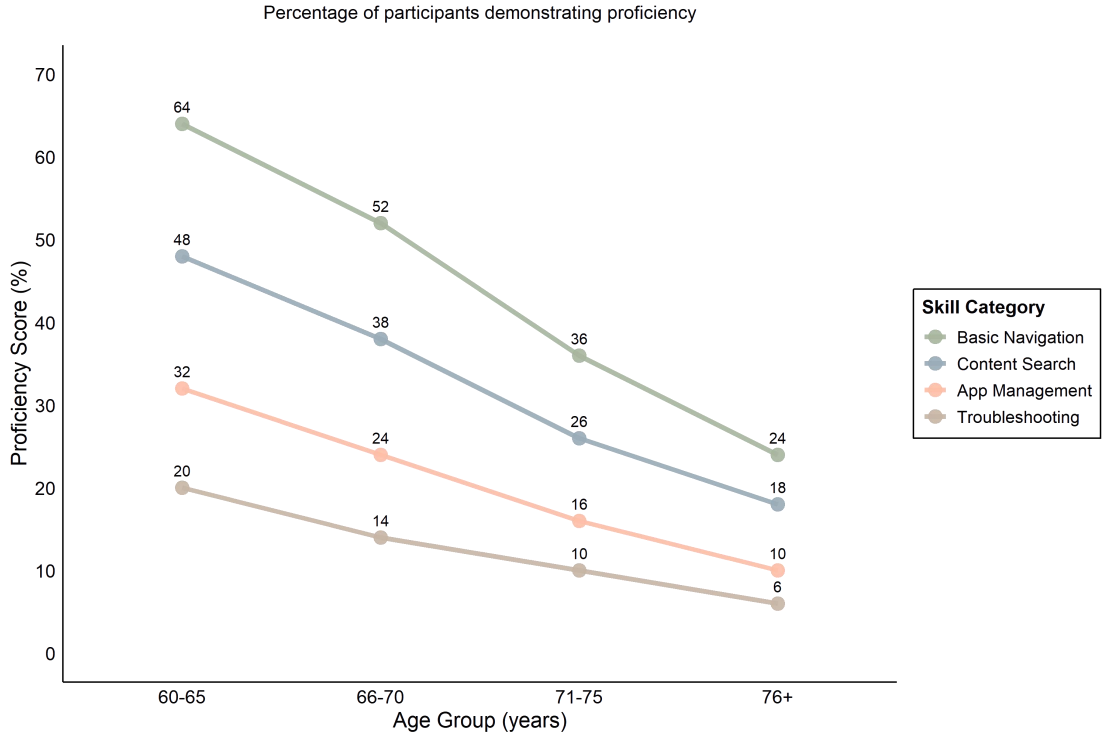

Figure 5. Digital literacy scores across age groups.

Economic constraints created additional barriers. Smart TV hardware costs ranging from 2,000-4,000 RMB represented 1-2 months of typical household income. Monthly internet subscription fees of 50-100 RMB strained limited budgets, particularly for elderly households dependent on modest pensions. Infrastructure limitations compounded individual-level barriers, with 43.2% of surveyed villages experiencing unreliable internet connectivity that disrupted streaming experiences.

Physical and cognitive age-related changes further complicated adoption. Visual impairments affected 58.5% of participants, making small screen text illegible. Motor control difficulties hindered precise remote control operation, while memory decline complicated password management and navigation sequence retention. These challenges created frustration cycles that reinforced technology avoidance behaviors among vulnerable elderly populations.

3.4. Changes in media consumption habits

The following analysis focuses specifically on the 168 participants who actively engaged with smart TV digital features, distinguishing them from users who employed smart TVs merely as traditional television replacements. This distinction is crucial as media consumption transformations occurred only among users who accessed advanced digital functionalities rather than all smart TV owners. Among these digital feature adopters, media consumption patterns demonstrated significant transformations while retaining traditional elements. Viewing time increased by an average of 1.8 hours daily, from 4.2 to 6.0 hours, as enhanced content variety encouraged extended engagement. **Figure 6** illustrates comprehensive changes in media consumption behaviors, revealing dramatic increases in on-demand viewing and active content selection.

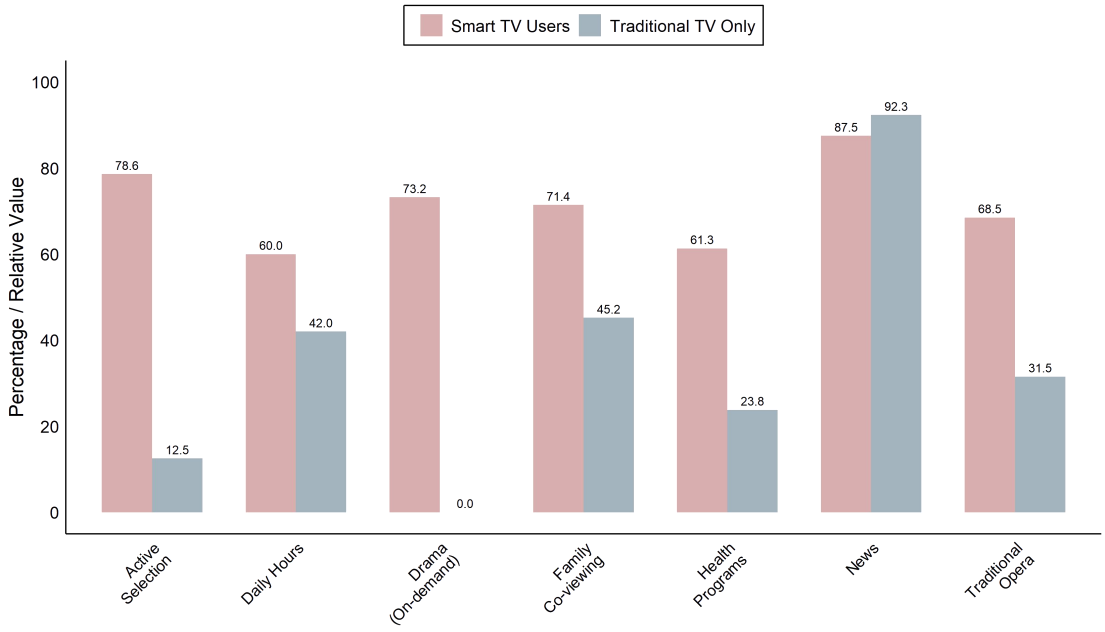

Figure 6. Media consumption patterns: Traditional TV vs. smart TV users.

Content preferences evolved to embrace both traditional and novel programming. **Table 3** quantifies these changes, showing that while news consumption decreased slightly (-5.2%), dramatic increases occurred in health program viewing (+157.6%) and traditional opera consumption (+117.5%). The availability of on-demand drama series transformed viewing habits, with 73.2% of smart TV users engaging with this previously unavailable feature.

Table 3. Media consumption pattern changes among smart TV adopters (n=168).

Media Behavior	Traditional TV Only	After Smart TV Adoption	Change (%)
Daily viewing hours	4.2 ± 1.3	6.0 ± 1.8	+42.9%
News consumption	92.3%	87.5%	-5.2%
Drama series (on-demand)	0%	73.2%	+73.2%
Health programs	23.8%	61.3%	+157.6%
Traditional opera	31.5%	68.5%	+117.5%
Family co-viewing	45.2%	71.4%	+58.0%
Active content selection	12.5%	78.6%	+528.8%

Social viewing behaviors transformed significantly, with family co-viewing increasing by 58.0%. Smart TV's diverse content libraries provided common ground across generations, enabling shared viewing experiences between grandparents and grandchildren. Video calling features facilitated virtual family gatherings, with 34.5% using smart TVs for holiday celebrations with distant relatives. Peak viewing shifted from rigid broadcast schedules to personalized patterns. Morning news broadcasts retained ritual significance for 76.2% of adopters, while evening entertainment viewing became more flexible. Active content selection jumped from 12.5% to 78.6%, a clear departure from merely receiving to actively engaging with the media.

But media habits of the past held steady even as digital adoption grew. Listening over hand-held radios did not change in the farm work, portable benefits being more important than receiving smart TV.This dual media sphere implies as much of a complementary as a substitutional relationship between traditional and digital settings. Among digital users, the media consumption changes support H3, revealing complementarity rather than substitution effects for those who progress beyond basic TV replacement usage. Traditional viewing rituals persisted alongside new on-demand behaviors, with family co-viewing actually increasing by 58%. This pattern suggests that smart TV augments existing practices rather than displacing them, challenging assumptions about digital displacement among elderly populations. The introduction of smart TV has improved rather than replaced former media practices, offering richer and more diversified media access for the rural elderly who could afford and adapt to digital transition.

4. Discussion

4.1. Smart streaming television adoption

The findings reveal a complex landscape of smart streaming television use among rural elderly people in China, which suggests several both promising opportunities and persistent challenges. The high level of smart TV penetration - 63.5% - means that the market is fully penetrated at the moment; however, the difference between this percentage and usage - 49.1% - reflects a considerable barrier in the meaningful use of the technology. This adoption-usage gap aligns with findings from qualitative investigations of smart technology adoption, which identified similar patterns and emphasized that ownership alone does not guarantee sustained engagement among elderly users[19]. The finding that 14.4% of smart TV owners use devices solely as traditional television replacements reveals the inadequacy of binary adoption models. This "digital underutilization" phenomenon suggests that technology ownership studies must distinguish between acquisition, basic usage, and comprehensive digital engagement. For rural elderly populations, smart TVs may serve as expensive traditional TV replacements rather than gateways to digital media consumption, highlighting the importance of examining actual usage patterns rather than ownership statistics alone.

The powerful predictive role of perceived usefulness (β=0.52), which is one characteristic of behavior, reflects the support of the theoretical underpinning of the model and the contextual subtext. The rural elderly interviewees did not value the appearance of innovation, something which was important to younger participants in a high-tech context. This finding resonates with previous research demonstrating that elderly users' technology adoption decisions center on functional value rather than technological sophistication [20]. This focus on the health and traditional entertainment content may indicate that successful smart TV integration is through the curation of the content to the cultural preferences and the health concerns of the elderly user.

Social influence pathways were very strong in rural areas, where interpersonal relationships play an important part in determining individual behaviors. The clustering nature in the adoption process reflects the collectivist culture of rural Chinese society, where peer approval is necessary legitimization for new

technology. Social networks significantly influence elderly users' willingness to adopt wearable devices, suggesting that community-based approaches may prove more effective than individual-targeted interventions for promoting technology adoption in rural settings [16].

This latter result - higher family involvement in the grandchildren's lives led to a more positive attitude - confirms how a dynamic of intergenerational exchange is crucial to consider in technology adoption processes. It was third-generation and up grandchildren and adult children that acted as technologized intermediaries; intermediaries between aging users and complex digital applications. This finding extends previous research emphasizing how family members serve as crucial intermediaries in elderly individuals' online health information seeking behaviors [21]. This dependency, however, also contributes to a vulnerability, since when family support is lacking, alternative support systems from the general population are necessary to secure that the adoption process becomes a sustainable process. These findings contribute to technology acceptance theory by revealing the limitations of individual-focused models for elderly populations. The dominance of perceived usefulness over ease of use suggests that elderly users prioritize functional value assessment over interface concerns, requiring theoretical modifications that account for this functional orientation. The substantial role of family support extends UTAUT's social influence construct by showing how intergenerational knowledge transfer operates in rural contexts where technology adoption becomes a collective rather than individual process.

4.2. Reshaping media consumption habits

The transition of smart TV adopters in media use patterns signifies both continuity and change in the elderly users' media use. The 42.9% rise in daily viewing hours indicates that smart TV is not simply cannibalizing traditional TV but growing total media consumption. It is contrary to fears related to technology replacing physical activities, but rather illustrates how digital tools can further enhance physical activities.

Digital technology usage among Chinese older adults has been associated with improved lifestyle outcomes, challenging concerns that digital engagement displaces beneficial traditional activities[22]. The large increase in active selection of content (from 12.5% to 78.6%) is indicative of a move from passive to active media consumption. Such a shift corresponds well with Uses and Gratifications Theory, whereby older users progress from schedule-based watching to selective viewing according to individual interests and expectations.

Similar patterns emerged during the COVID-19 pandemic, where elderly users developed more sophisticated media selection strategies when exposed to diverse digital content options[23]. The fact that old viewing habits endure alongside new ones is an indicator of the unopposed nature of digital adoption. The ritual morning viewing was unchanged despite on-demand service, suggesting that smart TV use does not displace culturally bound media practices.

This dual-media ecosystem reflects findings that elderly users value both traditional features (must-have attributes) and innovative functions (attractive attributes) in digital technologies, as identified through KANO model analysis[24]. The increased family co-viewing (58.0% growth) demonstrates how smart TV can strengthen intergenerational bonds rather than isolate elderly users. However, these positive outcomes apply specifically to rural elderly who progress beyond treating smart TVs as traditional television replacements to engage with digital functionalities. The substantial proportion of users who utilize smart TVs solely for broadcast viewing suggests that technology's transformative potential remains unrealized for many rural elderly, emphasizing the need for interventions that promote comprehensive rather than superficial technology engagement. Shared viewing experiences created new opportunities for family interaction,

particularly important given rural-urban migration patterns that separate many Chinese families. Similar positive impacts of digital technology on elderly individuals' social connections and consumption behaviors have been documented, suggesting broader implications for family cohesion in rapidly modernizing societies [25]. The complementary media consumption patterns contribute to media displacement theory by demonstrating age-specific integration processes. While younger users often substitute new technologies for old ones, elderly users follow an additive model where digital capabilities supplement traditional practices. This finding suggests that media displacement theory requires life-course modifications accounting for different adaptation strategies across age groups.

4.3. Implications for interventions

The barriers to adoption identified require interventions at multiple levels dealing with technical, educational, and infrastructure issues. The decline in the digital literacy scores among older age groups, especially for advanced-based tasks, indicates that information technology is not adequately designed to suit the cognitive and age-related changes in physical capacities. A comprehensive review of psychosocial barriers to healthcare technology adoption similarly identified trust, training adequacy, and organizational support as critical factors requiring systematic intervention[18]. Infrastructure constraints in 43.2% of villages constitute a structural barrier that needs a policy-level intervention. Not all relevant users are motivated and, even when they are, the stereotypical 70+ elderly cannot benefit from smart TV benefits.

Digital inclusion efforts in China must prioritize rural infrastructure development alongside individual skill training to effectively address access barriers [15]. They find that national and regional strategies involving investments in infrastructure combined with tailored support programs are most promising in dealing with rural digital divides as an expression of government policies. The financial hurdles identified can be met through innovative propositions in between the affordability of a product and its sustainability. Subsidized hardware, phased pricing of service, and group viewing facilities may enable overcoming the financial impediments and yet derive the benefit of such markets. Behavioral design interventions that consider elderly users' economic constraints have been shown to significantly improve smart device adoption rates [14]. Their focus on the guiding design principle of affordability supports the findings of this study on the economic concerns that rural elderly communities are confronting – affordability is the thing that forces people into their homes.

There is a need for education interventions to shift away from the traditional trainings and mobilize peer learning and multigenerational knowledge exchange. Given that family-based adoption has been successful, you could see youth-elderly technology pairing programs being particularly useful. Digital literacy improvements directly impact quality of life outcomes through hierarchical mediating mechanisms, emphasizing the importance of sustained educational support rather than one-time training sessions [17].

4.4. Study strengths and limitations

This mixed-methods study contributes substantially to knowledge about smart TV adoption among the rural elderly, combining statistical patterns and qualitative experiences. A large sample size (N=342) across three villages with varying digital development levels increases generalizability in similar rural Chinese settings. The exploration of technology acceptance with in-depth interviews reveals subtle adoption processes that quantitative approaches alone might not capture. However, several limitations warrant consideration. Additionally, due to the single measurement, the cross-sectional nature of the study precludes the inference of causality between adoption determinants and consumption changes. Longitudinal studies observing the technology journeys of older users over time would provide a better understanding of the sustainability of adoption and how usage patterns change.

The emphasis on Shandong Province enhances the depth but limits the generalization to other local areas with different economic features or cultural backgrounds. The study's focus on active digital users (rather than all smart TV owners) may overestimate the transformative impact of smart TV technology among rural elderly populations. Future research should examine the substantial proportion of users who treat smart TVs as traditional television replacements, investigating barriers that prevent progression from basic to digital usage patterns. Self-reported usage measures may inflate estimates of actual engagement due to social desirability bias. Further research, including objective measures of use through smart TV analytics, would allow for more precise measures of consumption. Furthermore, examining successful adopters of smart TVs may underrepresent those who have tried smart TV use but abandoned it, a group that deserves more targeted examination to unpack adoption failures. Smart TV technology is progressing at a lightning-fast pace, and the research results may soon be outdated as new interfaces are introduced and content offerings grow. Regular monitoring and updating of research on the application of technology and its effects on the elderly are needed.

Despite these limitations, the present study contributes useful information to researchers, policymakers, and technology practitioners towards the pursuit of promoting digital inclusion in vulnerable older adults who are increasingly entering the digital world.

5. Conclusion

This study has offered insights into the transformational potential of smart streaming television that has profound implications for the patterns of media consumption among the rural elderly in China. Its findings have shown that smart TV uptake among the rural elderly should not be seen as either the unproblematic reconstitution of their technology use or outright rejection of it; rather, it is an evolving pattern, prompted by functional needs, social dynamics, and structural limitations. The study has identified that technology and its successful implementation should match the functional goals and desires of the elderly users. Therefore, the perceived usefulness of the benefits has driven smart TV adoption, and the relevant viewing content and modes of use that are most important to the latter include family health and health content, traditional entertainments, and the ability to choose content and flexibility. The influence of the social context in the form of family relative support has also been crucial. This finding suggests that even when the elderly make individual decisions about technology harnessing, they remain embedded in the family and other social frameworks. The study has also revealed notable changes and continuities in media consumption patterns among the adopters. Hence, enhancing viewing time by 42.9%, dramatically increasing users' active selection of content, and fostering family co-viewing experiences suggest that smart TV supplements rather than replaces the existing media practices. Therefore, these findings disprove the idea of digital substitution and show how technology can be used to strengthen intergenerational relationships and cultural celebrations. However, these transformative effects apply specifically to the 49.1% of rural elderly who actively engage with smart TV digital features, while a substantial proportion use smart TVs solely as traditional television replacements. This study advances technology adoption theory by demonstrating the need for socially embedded models when studying elderly populations in collectivist contexts. The findings suggest that successful theoretical frameworks must account for family dynamics, cultural continuity, and functional orientations that distinguish elderly users from the younger populations on which most models were developed. However, the identifiable barriers, comprising technological complexity, the limitation of digital literacy, economic restrictions, and infrastructure deficiencies, require multilevel action. Therefore, digital incorporation would necessitate individual tech ability advancement, interface improvement, affordable structural investment, and reliable infrastructure growth. Future investigation should extend the empirical

framework to include longitudinal adoption routes, prohibitively nested preferences, and geographical dissimilarities. By recognizing the challenges of technology implementation by the rural elderly, policymakers and service providers can personalize technology design and connectedness and assist in maximizing digital society's benefits while conserving the cultural significance of the institutional practice.

Conflict of interest

There is no conflict of interest.

References

1. Liu, L., Wu, F., Tong, H., Hao, C., & Xie, T. (2021). The digital divide and active aging in China. International Journal of Environmental Research and Public Health, 18(23), 12675.
2. Zhang, H., & He, R. (2022). A study on digital inclusion of Chinese rural older adults from a life course perspective. Frontiers in Public Health, 10, 974998.
3. Wang, W., Zhang, Y., & Zhao, J. (2023). Technological or social? Influencing factors and mechanisms of the psychological digital divide in rural Chinese elderly. Technology in Society, 74, 102307.
4. Ming, Y., Li, Y., & Liu, Y. (2025). Digital technologies as solutions to China's aging population: a systematic review of their opportunities and challenges in rural development. Frontiers in Public Health, 12, 1416968.
5. Li, H., & Kostka, G. (2024). Navigating the digital age: The gray digital divide and digital inclusion in China. Media, Culture & Society, 46(6), 1181-1199.
6. Cui, Y., He, Y., Xu, X., Zhou, L., & Nutakor, J. A. (2024). Can cultural capital, cognitive ability, and economic capacity help rural older adults bridge the digital divide? Evidence from an empirical study. Frontiers in Public Health, 12, 1393651.
7. Li, R., Shao, J., & Gao, D. (2025). The impact of digital literacy on the health behavior of rural older adults: evidence from China. BMC Public Health, 25(1), 919.
8. 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.
9. Shang, X., Liu, Z., Gong, C., Hu, Z., Wu, Y., & Wang, C. (2024). Knowledge mapping and evolution of research on older adults' technology acceptance: a bibliometric study from 2013 to 2023. Humanities and Social Sciences Communications, 11(1), 1-21.
10. Ma, Y., & Luo, M. (2024). Older people's intention to use medical apps during the COVID-19 pandemic in China: an application of the Unified Theory of Acceptance and Use of Technology (UTAUT) model and the Technology of Acceptance Model (TAM). Ageing & Society, 44(7), 1515-1532.
11. Bhatiasevi, V. (2024). The uses and gratifications of social media and their impact on social relationships and psychological well-being. Frontiers in Psychiatry, 15, 1260565.
12. Zhou, C., Qian, Y., & Kaner, J. (2024). A study on smart home use intention of elderly consumers based on technology acceptance models. PLoS ONE, 19(3), e0300574.
13. Cheng, H., Lyu, K., Li, J., & Shiu, H. (2021). Bridging the digital divide for rural older adults by family intergenerational learning: A classroom case in a rural primary school in China. International Journal of Environmental Research and Public Health, 19(1), 371.
14. Sun, S., Qi, N., Li, H., & Xiao, L. (2025). Examining factors influencing the adoption of smart integrated devices by the elderly in the digital era: insights from behavioral design theory. Frontiers in Psychology, 16, 1540201.
15. Yang, Y., Xie, Z., Pan, J., & Cheng, Y. (2025). Experiences, challenges, and prospects of promoting digital inclusion of the elderly in China. Public Administration and Policy, 28(1), 76-87.
16. Wu, C., & Lim, G. G. (2024). Investigating older adults users' willingness to adopt wearable devices by integrating the technology acceptance model (UTAUT2) and the technology readiness index theory. Frontiers in Public Health, 12, 1449594.
17. Xin, Y., Weina, H., & Yan, D. (2025). Digital literacy impacts quality of life among older adults through hierarchical mediating mechanisms. Scientific Reports, 15(1), 19288.
18. Lee, A. T., Ramasamy, R. K., & Subbarao, A. (2025). Understanding psychosocial barriers to healthcare technology adoption: A review of TAM technology acceptance model and unified theory of acceptance and use of technology and UTAUT frameworks. Healthcare.
19. Yu, J., Huang, J., & Yang, Q. (2023). Long-term adoption or abandonment of Smart Technology in the Chinese Elderly Home Care Environment: a qualitative research study. Healthcare.
20. Sun, X., Yan, W., Zhou, H., Wang, Z., Zhang, X., Huang, S., & Li, L. (2020). Internet use and need for digital health technology among the elderly: a cross-sectional survey in China. BMC Public Health, 20(1), 1386.

21. Fang, Z., Liu, Y., & Peng, B. (2024). Empowering older adults: bridging the digital divide in online health information seeking. Humanities and Social Sciences Communications, 11(1), 1-11.
22. Cui, K., Zou, W., Ji, X., & Zhang, X. (2024). Does digital technology make people healthier: the impact of digital use on the lifestyle of Chinese older adults. BMC Geriatrics, 24(1), 85.
23. Bahfiarti, T., & Arianto, A. (2022). Uses and gratifications approach: influence of COVID-19 media exposure on millennial generation in Makassar city, Indonesia. Heliyon, 8(6).
24. Li, S., Yunus, M. M., Hussain, R. B. B. M., & Lin, W. (2025). Cultural adaptation to aging: a study on digital cultural adaptation needs of Chinese older adults based on KANO model. Frontiers in Public Health, 13, 1554552.
25. He, Y., Li, K., & Wang, Y. (2022). Crossing the digital divide: The impact of the digital economy on elderly individuals' consumption upgrade in China. Technology in Society, 71, 102141.