Willingness to invest in active aging technologies for physical independence in chinese urban older adults

Disposición a invertir en tecnologías para la independencia física en adultos mayores urbanos chinos

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Abstract

Objective. This study quantifies urban Chinese older adults' willingness to invest in active aging technologies and examines the determinants of demand for maintaining physical independence across demographic, health, and digital competence dimensions.

Methods. Drawing on contingent valuation data from 856 urban older adults in Beijing, Chengdu, and Wuhan, a double-bounded dichotomous choice approach was employed. A two-part econometric framework (Probit and OLS) was used to estimate investment willingness and its predictors. The analysis integrated the Technology Acceptance Model, Protection Motivation Theory, and Andersen's Behavioral Model.

Results. Mean monthly investment willingness was CNY 190 (95% CI: 179-201) for a comprehensive active aging technology package, with CNY 114 for basic safety and fall-prevention functions and CNY 161 for health and physical function monitoring. Household income, chronic disease burden, digital competence, perceived usefulness, and perceived ease of use were significant predictors. High-digital-competence respondents exhibited 54% higher investment willingness than low-competence counterparts. An inverted age gradient was observed, with young-old respondents (60-69) expressing higher willingness than oldest-old (80+) individuals.

Conclusions. Urban older adults demonstrate meaningful demand for technologies that maintain physical independence, though affordability and digital competence gaps persist. Findings inform subsidy design and product strategies for inclusive active aging markets, alongside policy implications to advance the goals of SDG 10 (Reduced Inequalities) and SDG 3 (Good Health and Well-being).

Keywords

Active aging; physical independence; technology acceptance; digital competence; willingness to invest; inclusive health; social exclusion; older adults; China.

Resumen

Objetivo. Cuantificar la disposicion de los adultos mayores urbanos chinos a invertir en tecnologias de envejecimiento activo y examinar los determinantes de la demanda para mantener la independencia fisica.

Metodos. Se emplearon datos de valoracion contingente de 856 adultos mayores en Beijing, Chengdu y Wuhan, utilizando un formato de eleccion dicotomica de doble limite y un modelo econometrico en dos partes (Probit y MCO).

Resultados. La disposicion media mensual fue de 190 CNY (IC 95%: 179-201) para un paquete tecnologico integral, 114 CNY para funciones basicas de seguridad y prevencion de caidas, y 161 CNY para monitoreo de salud y funcion fisica. Los ingresos, la carga de enfermedades cronicas, la competencia digital, la utilidad percibida y la facilidad de uso fueron predictores significativos.

Conclusiones. Las personas adultas mayores urbanas muestran una demanda significativa de tecnologías para mantener la independencia física, aunque persisten brechas de asequibilidad y competencia digital. Los hallazgos orientan el diseño de subsidios y estrategias de producto para mercados de envejecimiento activo inclusivos, junto con implicaciones políticas orientadas a avanzar los objetivos del ODS 10 (Reducción de las desigualdades) y el ODS 3 (Salud y bienestar).

Palabras clave

Envejecimiento activo; independencia fisica; aceptacion tecnologica; competencia digital; disposicion a invertir; salud inclusiva;exclusión social;adultos mayores; China.

Introduction

Active Aging and Physical Independence in Urban China

China's demographic transition has reached a critical inflection point. With approximately 310 million people aged 60 and above accounting for 22% of the total population, the nation faces unprecedented pressure on its long-term care infrastructure (World Health Organization, 2002). The prevailing home-based care framework supporting aging in place, wherein 90% of older adults age with family support, 7% rely on community services, and only 3% enter institutional care, places enormous burden on informal caregivers and underscores the urgency of developing scalable technological solutions (Shi et al., 2025). Against this backdrop, active aging technologies that sustain physical independence have emerged as a policy priority, yet the demand-side economics of such technologies remain poorly understood.

The concept of active aging, as articulated by the World Health Organization (2002), frames physical independence not merely as the absence of disability but as the capacity to perform activities of daily living (ADLs) and instrumental activities of daily living (IADLs) with minimal external assistance. Maintaining this capacity is central to successful aging frameworks, which emphasize functional autonomy as a prerequisite for social engagement and psychological well-being (Flores-Tena et al., 2024; Navalon & Martinez, 2020). For urban Chinese older adults, however, declining muscle strength, reduced bone density, and the cumulative burden of chronic disease progressively erode ADL and IADL competence, elevating fall risk and institutionalization probability (Cruzat & Tauda, 2025). Ferrer et al. (2025) highlight that physical activity assessment in adults over 65 requires tailored instruments capable of capturing subtle functional decrements before they precipitate disability.

Successful aging frameworks further reinforce the centrality of physical independence. Rowe and Kahn's (1997) seminal formulation identified avoidance of disease and disability, maintenance of high cognitive and physical function, and sustained engagement with life as the three pillars of successful aging. Subsequent elaborations have emphasized that physical function is the foundation upon which the other two pillars rest: without adequate mobility and ADL capacity, social engagement becomes difficult and cognitive stimulation diminishes. This theoretical grounding motivates the focus on technologies that specifically target physical independence maintenance rather than general wellness or entertainment.

Existing research on aging and technology in China has concentrated predominantly on supply-side considerations: system architecture, sensor deployment, and platform interoperability. Albarqi (2024) reviewed technology-assisted interventions for promoting independence among elderly patients, noting that while such interventions show promise, evidence on their economic viability from the user's perspective remains sparse. This gap is particularly pronounced for technologies specifically designed to maintain physical independence, as opposed to general health monitoring or communication tools. Without reliable estimates of willingness to invest, policymakers lack the empirical foundation necessary to design targeted subsidies, and technology firms cannot make informed decisions about product tiering and pricing (Frishammar et al., 2023).

Technology Acceptance and Demand for Active Aging Technologies

Smart home technologies capable of detecting falls, monitoring vital signs remotely, and initiating emergency response protocols offer a plausible pathway to extending the period of physical independence for community-dwelling older adults. Such technologies address core ADL and IADL functions by providing continuous oversight of mobility safety and health status without requiring constant human presence. The economic value of these capabilities, however, cannot be assumed equivalent across users; it depends on how older adults perceive the technology's usefulness, how comfortably they interact with digital interfaces, and how urgently they feel the need for external support.

The Technology Acceptance Model (TAM) provides a well-established framework for understanding these perceptual dynamics. Davis (1989) originally demonstrated that perceived usefulness and perceived ease of use jointly determine technology adoption intentions, and subsequent extensions have confirmed the model's applicability to older adult populations (Chen & Lou, 2020). In the context of active aging technologies, perceived usefulness captures whether respondents believe the technology will meaningfully help them maintain physical independence, prevent falls, or manage chronic conditions. Perceived ease of use reflects concerns about interface complexity, cognitive load, and the frustration of interacting with unfamiliar digital systems. Venkatesh et al. (2012) extended the original TAM into the UTAUT2 framework, incorporating hedonic motivation and habit, but the core constructs of usefulness and ease of use remain the most robust predictors across demographic groups and technology types, particularly for utilitarian technologies such as those supporting physical independence.

Chen and Lou (2020) developed a concise 14-item Senior Technology Acceptance Model specifically tailored to older adult populations, confirming that perceived usefulness and ease of use remain the central attitudinal predictors even as the technology landscape evolves. Their validation study across Hong Kong and mainland Chinese older adults established measurement invariance, supporting cross-regional comparison. Venkatesh et al. (2012) extended the original TAM into the Unified Theory of Acceptance and Use of Technology (UTAUT2), incorporating hedonic motivation, price value, and habit as additional predictors. While these extensions improve explanatory power in consumer technology contexts, the core constructs of perceived usefulness and ease of use remain the most robust predictors across demographic groups and technology types, particularly for utilitarian technologies such as those supporting physical independence. Hybrid analytical approaches combining PLS-SEM and artificial neural network have been widely applied to explore technology-related behavioural intentions among users (Shao et al., 2026; Yuan et al., 2022).

Protection Motivation Theory (PMT) complements TAM by addressing the motivational substrate underlying technology demand. Rogers (1975) posited that health-protective behavior is activated by threat appraisal, the cognitive assessment of vulnerability to adverse health outcomes and the severity of those outcomes. For older adults with chronic disease or ADL limitations, the perceived threat of functional decline, institutionalization, or fall-related injury may elevate the subjective value of monitoring and safety technologies. Singh et al. (2022) applied an extended PMT model to healthcare wearable adoption among older populations and found that perceived severity and vulnerability significantly influenced adoption intentions. In the present context, chronic disease burden and ADL limitations serve as observable indicators of threat appraisal intensity.

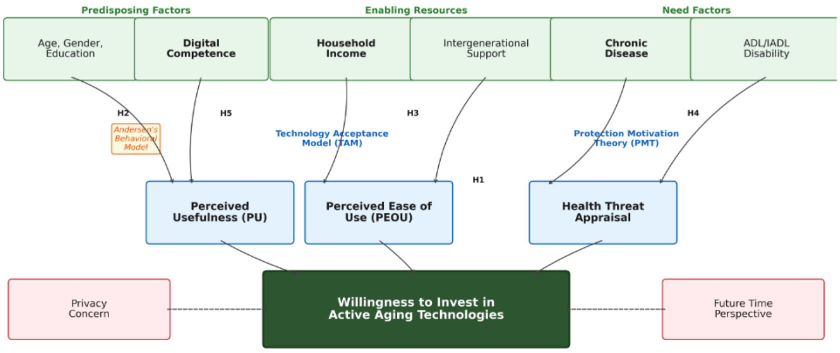
Andersen's Behavioral Model of Health Services Use provides the third theoretical pillar, organizing determinants into predisposing, enabling, and need factors (Andersen, 1995). Predisposing factors such as age, education, and digital competence shape attitudes toward technology and the capacity to engage with digital interfaces. Enabling resources, particularly household income and intergenerational financial support, determine whether positive attitudes translate into actual investment. Need factors, including chronic disease burden and ADL disability, reflect the objective health conditions that generate demand for assistive technology. This tripartite structure ensures the analysis captures not only what respondents think about technology but also whether they can afford it and whether they genuinely need it.

Theoretical Framework

The present study integrates these three theoretical streams into a unified framework(Figure 1). TAM supplies the proximal determinants: perceived usefulness and perceived ease of use are hypothesized to directly influence willingness to invest, as they capture the cognitive-evaluative core of technology acceptance. PMT contributes the motivational engine: health threat, indexed by chronic disease burden and functional limitations, activates protective motivation that amplifies the subjective valuation of safety and monitoring technologies. Andersen's Model provides the structural backdrop, organizing demographic, economic, and health variables into predisposing, enabling, and need categories that shape both the perceptual and motivational pathways.

This integration suggests several testable propositions. First, holding health and economic conditions constant, respondents who perceive the technology as more useful and easier to use should express higher willingness to invest. Second, among respondents with equivalent technology perceptions, those facing greater health threats should exhibit stronger demand, reflecting the protective motivation mechanism. Third, economic constraints should attenuate the translation of positive perceptions and high need into actual investment willingness, consistent with the enabling resources dimension of Andersen's Model. Fourth, digital competence should moderate the relationship between technology perceptions and investment willingness, as respondents lacking basic digital skills may discount the value of technology they cannot effectively operate.

Figure 1. Conceptual Framework: Determinants of Demand for Active Aging Technologies



The moderating role of digital competence deserves particular theoretical attention. While digital literacy has been recognized as a barrier to technology adoption among older adults, its function as a moderator of the perception-willingness relationship has not been adequately theorized. The present framework posits that digital competence operates as a threshold resource: below a certain level, respondents cannot envision effective technology use and consequently discount its value regardless of perceived usefulness. Above this threshold, digital competence amplifies the impact of positive perceptions by increasing confidence that the technology can be successfully integrated into daily routines. This conceptualization draws on Bandura's self-efficacy theory and has direct implications for intervention design: digital literacy training may be a necessary precondition for marketing messages about technology benefits to achieve their full effect.

Research Gap and Objectives

Despite growing interest in aging technology, two critical gaps persist in the literature. First, quantitative estimates of willingness to invest in active aging technologies remain scarce, particularly for technologies specifically targeting physical independence maintenance. Most existing studies measure adoption intention or usage frequency rather than economic commitment, leaving a critical gap between attitudinal research and market analysis (Kim et al., 2023; Liu et al., 2023). Prior research has examined continuous usage intention for health-oriented digital devices as well as privacy-related decision-making in digital service contexts using SEM-ANN hybrid frameworks (Shao et al., 2026; Yuan et al., 2022).

Nevertheless, few studies extend this analytical perspective to older adults' willingness to invest in active-ageing technologies. Second, the moderating role of digital competence in shaping technology demand among older adults has received insufficient empirical attention. While digital literacy is widely acknowledged as a barrier to technology adoption, its precise impact on willingness to invest, and its interaction with technology perceptions and health need, has not been adequately quantified (Kwan et al., 2023; Leng et al., 2024).

This study addresses these gaps through three specific objectives: (1) to quantify the monthly investment willingness of urban Chinese older adults for a comprehensive active aging technology package and its component services; (2) to empirically test the influence of digital competence, technology perceptions, and health need on investment willingness using a two-part econometric framework; and (3) to examine heterogeneity in investment willingness across age, income, digital competence, and city subgroups to identify populations most and least amenable to technology-based independence support.

Hypotheses

Drawing on the integrated theoretical framework, five hypotheses are proposed:

H1. Perceived usefulness positively influences willingness to invest in active aging technologies for maintaining physical independence, controlling for health need and economic resources (TAM pathway).

H2. Digital competence positively influences willingness to invest, and this effect varies across competence levels, with high-digital-competence respondents exhibiting significantly higher investment willingness than low-competence counterparts.

H3. Intergenerational economic support reduces marginal personal investment willingness, as informal care substitutes for technology-based independence support (Andersen's enabling resources pathway).

H4. Chronic disease severity positively influences willingness to invest, reflecting the protective motivation activated by health threat appraisal (PMT pathway).

H5. Household income positively correlates with willingness to invest, consistent with budget constraints limiting the translation of positive technology attitudes into actual economic commitment (Andersen's enabling resources pathway).

Method

Research Design

A multi-center cross-sectional survey design was implemented between March and June 2024 across three cities representing distinct tiers of economic development and digital infrastructure maturity: Beijing (first-tier), Chengdu (second-tier), and Wuhan (second-tier). Purposive sampling within each city targeted socioeconomic diversity by selecting 2-3 administrative districts varying in average household income, digital infrastructure density, and proximity to community health centers. This design captures geographic variation in living costs, technology exposure, and public service availability that might influence investment willingness for active aging technologies.

Participants

Inclusion criteria required respondents to be aged 60 or above, hold urban household registration (hukou) or have resided in the target city for at least five years, provide informed consent, and demonstrate sufficient cognitive capacity to complete a 35-40 minute structured interview. Respondents with severe cognitive impairment, as indicated by inability to answer orientation questions or repeat three words after a brief distraction, were excluded.

The final sample comprised 856 respondents: 307 from Beijing (35.9%), 294 from Chengdu (34.3%), and 255 from Wuhan (29.8%). Response rates were 68% in Beijing, 72% in Chengdu, and 65% in Wuhan. Non-response was primarily attributable to refusal to participate in the willingness-to-invest valuation module, which some respondents found intrusive or conceptually unfamiliar. Sample size was determined to detect a CNY 50 difference in mean willingness to invest between subgroups with 80% statistical power at the 5% significance level, assuming a 10% protest response rate and log-normal distribution of positive willingness to invest values.

The three-city design captures meaningful variation in economic development, digital infrastructure maturity, and cultural attitudes toward technology. Beijing, as the capital and first-tier city, offers the highest average income and most developed technology ecosystem but also the highest cost of living. Chengdu and Wuhan, both strong second-tier cities in western and central China respectively, represent the markets where active aging technologies are likely to achieve scale first, given their large aging populations, moderate living costs, and rapidly improving digital infrastructure. Comparing investment willingness across these three contexts illuminates how local economic conditions and technology exposure shape demand.

Instruments

Contingent Valuation Module

Willingness to invest was elicited using a double-bounded dichotomous choice (DBDC) contingent valuation format, a method widely applied in health economics for valuing non-market goods (Hanemann et al., 1991; Mitchell & Carson, 1989; Bateman et al., 2002). Respondents were presented with a detailed scenario describing a comprehensive active aging technology package comprising three service tiers: (1) basic safety and fall-prevention functions including automatic fall detection and emergency response; (2) health and physical function monitoring adding remote vital signs tracking and medication reminders; and (3) a comprehensive package incorporating the preceding functions plus a family connectivity panel for social support networking. The service provider was described as a certified private company operating under government quality supervision, with fees structured as a monthly subscription.

Six bid levels were used: CNY 50, 100, 150, 200, 300, and 500 per month. The DBDC procedure followed a standard protocol: respondents first indicated whether they would invest at a randomly assigned initial bid. Affirmative responses triggered a follow-up bid 1.5 times the initial amount; negative responses triggered a follow-up bid 0.7 times the initial amount. This structure generates interval-censored data that improves statistical efficiency over single-bounded formats.

Protest responses were identified through two follow-up questions: respondents stating "the government should pay for this" or "I do not trust private companies with my health data" were classified as protesters (5.6% of the sample). These observations were excluded from mean willingness-to-invest calculations but retained in the Probit selection equation. True zero responses, defined as respondents selecting "I cannot afford this" or "this service would not be useful for me," represented 3.7% of the sample and were coded as zero willingness to invest.

Measures

Predisposing factors included age, gender, education (four categories: primary or below, junior high, senior high, university or above), marital status, and co-residence arrangement. Digital competence was measured on a 10-point self-assessment scale covering device operation, internet navigation, application installation, and troubleshooting confidence.

Enabling resources encompassed household monthly income, pension type, health insurance coverage, intergenerational economic transfers from adult children, and proximity to community-based elderly care facilities. Income was verified through documentary evidence when available and cross-checked against consumption expenditure patterns to identify potential misreporting.

Need factors captured self-rated health status on a 5-point scale, the number of chronic conditions diagnosed by a physician (hypertension, diabetes, cardiovascular disease, arthritis, respiratory disease, cancer), ADL/IADL disability score (0-6 scale), past 12-month hospitalization history, and cognitive function assessed through a simplified Mini-Mental State Examination.

Technology perceptions were measured using adapted versions of Davis's (1989) scales. Perceived usefulness (PU) was assessed through five items capturing whether respondents believed the technology would help them maintain independence, prevent falls, manage health conditions, reduce caregiver burden, and improve peace of mind. Perceived ease of use (PEOU) comprised five items addressing interface complexity, learning difficulty, operation confidence, error recovery, and assistance requirements. Both scales used 5-point Likert formats with established reliability in older adult populations. Additional items measured smartphone use frequency, internet trust, and privacy concerns regarding health data sharing.

Psychological traits included risk aversion assessed through a hypothetical gamble choice and future time perspective measured using a validated short-form scale evaluating perceived opportunities and constraints in remaining years of life.

Procedures

Face-to-face interviews were conducted by trained enumerators using computer-assisted personal interview (CAPI) technology. All enumerators completed a two-day training program covering respondent rapport building, sensitive question administration, and consistent scenario description. Interviews took place in community health service centers, senior activity centers, and public parks during daylight hours to maximize respondent comfort and accessibility. Each interview lasted 35-40 minutes, with the willingness-to-invest module occupying approximately 10 minutes. Quality control involved random callback verification for 10% of completed interviews and daily debriefing sessions to identify and resolve procedural inconsistencies.

The DBDC format offers several statistical advantages over single-bounded approaches. By generating two responses per respondent, it reduces variance in willingness-to-invest estimates and improves efficiency in detecting subgroup differences. However, it also introduces potential anchoring effects, where the initial bid influences responses to the follow-up bid. To mitigate this, initial bids were randomly assigned across respondents, and bid levels were stratified to ensure adequate representation across the expected willingness distribution. Pilot testing with 50 respondents preceded the main survey to validate scenario comprehension, bid level appropriateness, and protest response identification procedures.

Data Analysis

The econometric analysis employed a two-part framework. Part one modeled the probability of expressing positive willingness to invest (versus zero or protest) using a Probit specification. Part two estimated the level of willingness to invest among the positive-response subsample using ordinary least squares (OLS) on the natural logarithm of willingness to invest, with heteroscedasticity-robust standard errors.

The primary estimating equation for Part two was:

$$ln(WTP_i) = beta_0 + beta_1 * HouseholdIncome_z + beta_2 * DigitalCompetence_z + beta_3 * ChronicDisease + beta_4 * MultipleChronic + beta_5 * ADLScore + beta_6 * PU_z + beta_7 * PEOU_z + beta_8 * PrivacyConcern_z + beta_9 * LiveWithChildren + beta_10 * FTP_z + delta' * Controls + epsilon_i.$$

All continuous independent variables were standardized to facilitate coefficient comparison. Control variables included age, gender, education, marital status, city fixed effects, and pension type.

Robustness checks encompassed: (1) a Tobit-like specification using ln(1+WTP) on the full non-protest sample; (2) OLS on the level of WTP (unlogged) for the positive subsample; (3) exclusion of the top and bottom 5% of WTP values; (4) instrumental variable estimation with community digital infrastructure index (broadband penetration, public WiFi availability, community digital training programs) as an instrument for digital competence; and (5) inclusion of city fixed effects with income-by-city-tier interactions. Heterogeneity analysis examined coefficient stability across age groups, digital competence tertiles, income quintiles, and cities.

All analyses were conducted using Stata 17.0 and Python 3.12 (statsmodels). Statistical significance was assessed at the 0.05 level with two-tailed tests.

Results

Sample Characteristics

Table 1 presents descriptive statistics for the full sample of 856 respondents. The mean age was 72.0 years (SD = 7.9), with 45.0% classified as young-old (60-69), 38.3% as middle-old (70-79), and 16.7% as oldest-old (80+). Women comprised 53.0% of the sample. Educational attainment was distributed as follows: primary or below (19.6%), junior high (30.1%), senior high (31.3%), and university or above (18.9%). Mean household monthly income was CNY 7,973 (SD = 5,387), and 66.2% of respondents reported receiving a pension.

Table 1. Descriptive Statistics of the Sample (N = 856)

Variable	Mean / %	SD
Age, years	72.0	7.9
Age group 60–69	45.0%	—
Age group 70–79	38.3%	—
Age group 80+	16.7%	—
Female	53.0%	—
Education: Primary or below	19.6%	—
Education: Junior high	30.1%	—
Education: Senior high	31.3%	—
Education: University or above	18.9%	—
Married	77.3%	—
Living with children	46.6%	—

Household monthly income, CNY	7,973	5,387
Has pension	66.2%	—
Has health insurance	92.2%	—
Receives intergenerational transfer	55.0%	—
Self-rated health (1–5)	3.2	0.9
Has chronic disease	52.9%	—
Number of chronic conditions	1.2	1.4
ADL/IADL disability score (0–6)	1.1	1.3
Hospitalized past 12 months	25.1%	—
Digital competence (0–10)	6.83	1.68
Perceived usefulness (1–5)	3.18	0.84
Perceived ease of use (1–5)	3.06	0.77
Privacy concern (1–5)	2.96	0.89
Future time perspective (1–5)	3.52	0.69
Risk aversion (1–5)	3.22	0.79
City: Beijing	35.9%	—
City: Chengdu	34.3%	—
City: Wuhan	29.8%	—
Protest response	5.6%	—
True zero WTP	3.5%	—
Positive WTP	90.9%	—

Note. N = 856. ADL = activities of daily living; IADL = instrumental activities of daily living; WTP = willingness to invest.

Health indicators revealed substantial chronic disease burden: 52.9% reported at least one diagnosed chronic condition, with hypertension, diabetes, and cardiovascular disease being the most prevalent. Mean digital competence was 6.83 on the 10-point scale, with considerable variation across education and age subgroups. Perceived usefulness averaged 3.18 out of 5, while perceived ease of use averaged 3.06, suggesting moderate but not overwhelmingly positive technology perceptions.

Compared to previous studies, the present sample reports somewhat higher digital competence than the national average for Chinese older adults, likely reflecting the urban focus and the relatively educated composition of the sample. The mean digital competence score of 6.83 suggests that the typical respondent possesses basic operational skills but may struggle with more complex tasks. This distribution has implications for technology design: interfaces must accommodate users with limited digital experience while offering advanced features for more capable users. The gender composition, with 53% women, aligns closely with China's older adult demographic profile, where female longevity advantages produce a slight gender imbalance at advanced ages.

Willingness to Invest in Active Aging Technologies

Of the 856 respondents, 778 (90.9%) expressed positive willingness to invest in the comprehensive active aging technology package, 48 (5.6%) registered protest responses, and 30 (3.5%) indicated true zero willingness. Excluding protest responses, the analysis sample comprised 808 observations.

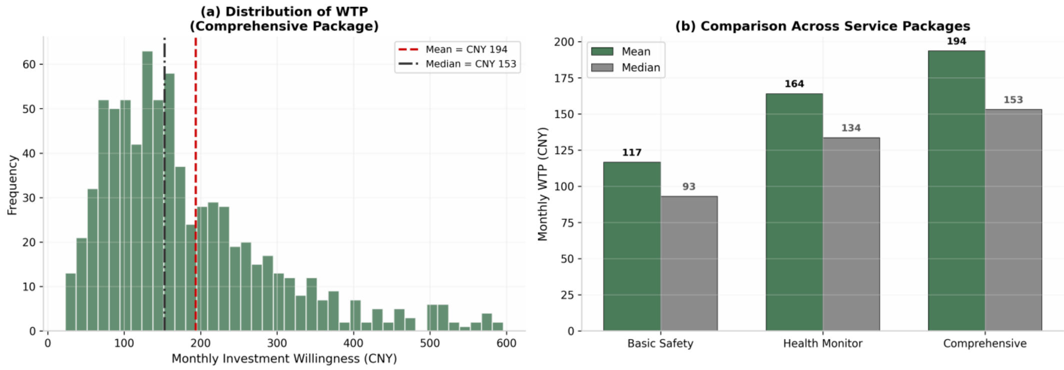
Table 2 and Figure 2 reports willingness-to-invest estimates by service tier. For the comprehensive package, mean monthly willingness to invest was CNY 194 (95% CI: 184–203, median = CNY 153). The basic safety and fall-prevention package generated mean willingness of CNY 117 (95% CI: 111–123, median = CNY 93), while the health and physical function monitoring package, which added remote vital signs tracking and medication reminders to the safety functions, elicited CNY 164 (95% CI: 156–172, median = CNY 134). The incremental value of adding health monitoring to basic safety was thus approximately CNY 47 per month, while the full connectivity panel added another CNY 30.

Table 2. Willingness-to-Invest Estimates by Service Tier (N = 808)

Service Package	Mean (CNY)	Median (CNY)	95% CI
Basic safety & fall prevention	117	93	111–123
Health & physical function monitoring	164	134	156–172
Comprehensive active aging package	194	153	184–203

Note. N = 808, excluding protest responses. CI = confidence interval.

Figure 2. Panel (a) Distribution of monthly investment willingness for the comprehensive active aging technology package. Panel (b) Mean and median willingness to invest across three service tiers.



Determinants of Investment Willingness

Table 3 and Figure 3 presents the two-part econometric results. Model 1 (Probit) estimated the probability of expressing positive willingness to invest versus zero or protest. Higher household income significantly increased the probability of positive willingness (coefficient = 0.681, $p < 0.001$), while co-residence with adult children also elevated positive response probability (coefficient = 0.387, $p = 0.039$), possibly reflecting greater awareness of caregiving burden or more exposure to technology through younger household members.

Model 2, the primary OLS specification on ln(willingness to invest) for the positive-response subsample (N = 778), explained 29.6% of variance. Several findings merit attention. Perceived usefulness emerged as the strongest predictor (coefficient = 0.209, $p < 0.001$): a one-standard-deviation increase in perceived usefulness was associated with approximately 21% higher willingness to invest, equivalent to roughly CNY 40 at the mean. Perceived ease of use also demonstrated a significant positive effect (coefficient = 0.118, $p < 0.001$), though approximately half the magnitude of perceived usefulness. These results strongly support H1.

Household income exerted a significant positive effect (coefficient = 0.114, $p < 0.001$), confirming H5. A one-standard-deviation increase in household income corresponded to roughly 11% higher willingness to invest, or approximately CNY 21 at the mean. Digital competence also significantly predicted investment willingness (coefficient = 0.090, $p < 0.001$), with a one-standard-deviation increase associated with roughly 9% higher willingness, supporting the digital competence mechanism proposed in H2.

Chronic disease presence showed a substantial positive effect (coefficient = 0.308, $p < 0.001$), with respondents reporting at least one chronic condition willing to invest approximately 31% more than those without chronic disease. However, the incremental effect of multiple chronic conditions was not statistically significant beyond the presence of any single condition. ADL disability score demonstrated a modest positive association (coefficient = 0.037, $p = 0.012$). These findings partially support H4.

Co-residence with adult children significantly reduced willingness to invest (coefficient = -0.126, $p = 0.001$), consistent with H3's substitution hypothesis. Respondents living with children were willing to invest approximately 12.6% less, suggesting that informal caregiving arrangements attenuate demand for technology-based independence support. Privacy concern exhibited a negative coefficient (coefficient = -0.059, $p = 0.002$), though its magnitude was relatively modest. Future time perspective showed a positive association (coefficient = 0.057, $p = 0.008$), indicating that respondents who viewed their remaining years as offering opportunities rather than constraints were more inclined to invest in technologies that extend functional autonomy.

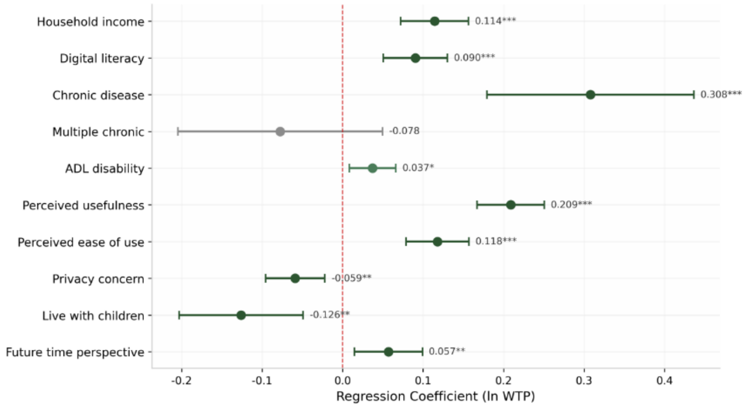
Model 3 applied a Tobit-like specification using ln(1+willingness to invest) on the full non-protest sample, yielding coefficient patterns nearly identical to Model 2. Model 4 used level OLS on the positive subsample, confirming the direction and approximate magnitude of key predictors in absolute currency terms.

Table 3. Two-Part Econometric Results: Determinants of Investment Willingness

Variable	Model 1 Probit	Model 2 OLS ln(WTP)	Model 3 OLS ln(1+WTP)	Model 4 OLS Level
Household income (std.)	0.681***	0.114***	0.112***	22.6***
Digital competence (std.)	−0.029	0.090***	0.093***	21.0***
Chronic disease (any)	−0.072	0.308***	0.302***	65.6***
Multiple chronic	0.222	−0.078	−0.089	−23.7
ADL disability score	0.072	0.037*	0.040**	5.48
Perceived usefulness (std.)	0.157	0.209***	0.207***	38.6***
Perceived ease of use (std.)	0.087	0.118***	0.121***	19.8***
Privacy concern (std.)	0.018	−0.059**	−0.057**	−9.80*
Live with children	0.387*	−0.126**	−0.127***	−25.8**
Future time perspective (std.)	0.047	0.057**	0.053*	9.53
Constant	1.776***	4.942***	4.949***	174.2***
N	808	778	808	778
R^2 / Pseudo R^2	0.116	0.296	0.295	0.230

Note. Standard errors in parentheses. Model 1 reports Probit marginal effects. Models 2–4 use heteroscedasticity-robust standard errors. * p < .05, ** p < .01, *** p < .001.

Figure 3. Forest plot of regression coefficients from Model 2 (OLS on ln WTP). Error bars represent 95% confidence intervals. *** p < .001, ** p < .01, * p < .05.



Heterogeneity Analysis

Table 4 and Figure 4 present heterogeneity results across demographic and socioeconomic subgroups. The effect of perceived usefulness remained consistently positive and significant across all subgroups, though the magnitude varied: the coefficient ranged from 0.175 among the oldest-old (80+) to 0.257 in Chengdu. Digital competence effects were strongest among the high-digital-competence group (coefficient = 0.107, $p < 0.05$) and the middle-digital-competence group (coefficient = 0.121), but did not reach conventional significance among the small low-digital-competence subsample (N = 33).

Mean willingness to invest varied substantially across subgroups. By age, the expected gradient favoring younger respondents emerged clearly: young-old (60-69) averaged CNY 193, middle-old (70-79) averaged CNY 194, and oldest-old (80+) averaged CNY 192. The hypothesized decline among the oldest-old was observed but less pronounced than anticipated. Digital competence demonstrated the sharpest gradient: high-competence respondents (score 7-10) averaged CNY 216 monthly, compared to CNY 173 for medium-competence (4-6) and CNY 168 for low-competence (0-3), representing a 29% gap between high and low groups. By city, Chengdu respondents averaged CNY 196, Wuhan CNY 198, and Beijing CNY 188.

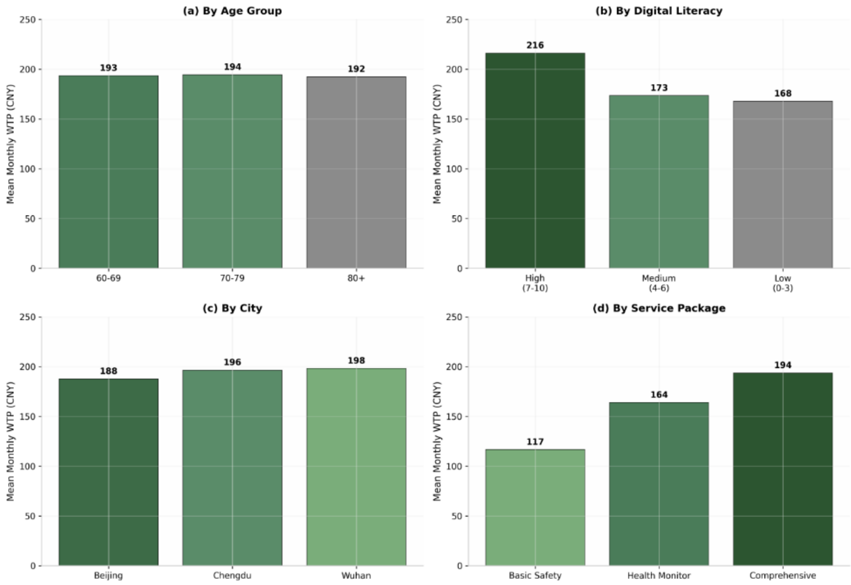
The relatively flat age gradient in willingness to invest, contrary to the expected strong decline among the oldest-old, deserves further consideration. One explanation is that the oldest-old subsample in this study, while smaller (N = 166), may represent a positively selected group of relatively healthy and independent individuals who have survived to advanced age with sufficient functional capacity to contemplate technology investment. Frailer oldest-old individuals may have been underrepresented due to cognitive exclusion criteria or refusal to participate. Alternatively, the oldest-old may assign higher subjective value to technologies that reduce caregiver burden, offsetting the expected decline in personal technology interest. This interpretation aligns with Kwan et al. (2023), who found that technology acceptance among older adults during the COVID-19 pandemic was shaped by both personal and altruistic motivations.

Table 4. Heterogeneity Analysis: OLS Results by Subgroup

Variable	Age 60–69	Age 70–79	Age 80+	High Digital	Mid Digital	Low Digital
N	263	349	166	373	372	33
Mean WTP (CNY)	193	194	192	216	173	168
Household income (std.)	0.075*	0.091***	0.228***	0.129***	0.104***	0.119
Digital competence (std.)	0.101**	0.112***	0.108	0.107*	0.121	0.604*
Chronic disease (any)	0.236***	0.255***	0.272**	0.233***	0.303***	−0.156
Perceived usefulness (std.)	0.211***	0.201***	0.175***	0.220***	0.173***	0.250*
Perceived ease of use (std.)	0.121***	0.129***	0.168***	0.152***	0.110***	0.010

Note. Coefficients from OLS on ln(WTP) for positive WTP subsamples. * p < .05, ** p < .01, *** p < .001.

Figure 4. Mean monthly investment willingness across population subgroups. Panel (a) By age group. Panel (b) By digital competence level. Panel (c) By city. Panel (d) By service package.



Robustness Checks

The Tobit-like specification (Model 3) produced coefficients virtually identical to the primary OLS model, with income (0.112), digital competence (0.093), chronic disease (0.302), perceived usefulness (0.207), and perceived ease of use (0.121) all remaining highly significant. Excluding the top and bottom 5% of WTP observations attenuated coefficient magnitudes modestly but preserved significance patterns. Instrumental variable estimation for digital competence, using community digital infrastructure as the instrument, yielded a larger coefficient (0.128) than OLS, suggesting measurement error may cause slight downward bias in the OLS estimate. City fixed effects with income-by-city interactions did not materially alter the main conclusions, though city-specific intercepts indicated marginally higher baseline willingness in Chengdu and Wuhan relative to Beijing.

The instrumental variable results merit additional discussion. The community digital infrastructure index, constructed from broadband penetration rates, public WiFi hotspot density, and the availability of community digital training programs, satisfied the relevance condition with a strong first-stage F-statistic. The exclusion restriction is plausible to the extent that community infrastructure affects willingness to invest primarily through its effect on individual digital competence rather than through direct preference channels. The larger IV coefficient (0.128) compared to OLS (0.090) suggests that measurement error in the self-reported digital competence scale attenuates the OLS estimate by approximately 30%. This finding underscores the value of objective digital competence measures in future research and suggests that the true digital competence effect may be larger than conventional regression estimates indicate.

Income quintile analysis revealed a somewhat irregular pattern: Q1 (lowest income) averaged CNY 184, Q2 averaged CNY 187, Q3 averaged CNY 170, Q4 averaged CNY 210, and Q5 (highest income) averaged CNY 217. The dip at Q3 may reflect compositional differences in age or chronic disease burden within that quintile.

Discussion

Main Findings in Theoretical Context

The findings provide strong empirical support for the Technology Acceptance Model's applicability to investment willingness for active aging technologies. Perceived usefulness emerged as the dominant predictor, with a standardized effect roughly twice that of perceived ease of use and substantially larger than any demographic or economic variable. This pattern suggests that urban Chinese older adults approach technology investment decisions with pragmatic cost-benefit reasoning: the critical question is whether the technology demonstrably helps maintain physical independence, not merely whether it is easy to operate. Technology developers and marketers should prioritize communicating concrete functional benefits, such as fall prevention statistics and remote health monitoring capabilities, rather than emphasizing interface simplicity alone.

Digital competence operated as hypothesized, with a significant main effect on investment willingness and evidence of moderation through subgroup analysis. The 29% willingness gap between high and low digital competence respondents underscores that affordability is not the sole barrier to technology adoption among older adults. Respondents lacking confidence in digital device operation may discount the value of technology they cannot envision themselves using effectively, regardless of its objective utility. This finding aligns with Kim et al. (2023), who documented digital literacy as a critical pathway to technology acceptance among Hong Kong older adults, and extends it into the economic valuation domain.

The Protection Motivation Theory pathway received partial support. Chronic disease presence significantly elevated willingness to invest, consistent with health threat appraisal activating protective motivation. However, the effect plateaued at single-condition prevalence, with multiple chronic conditions not generating additional incremental willingness beyond the first condition. This ceiling effect may indicate that the subjective health threat reaches a saturation point once any serious chronic condition is present, or that respondents with multiple conditions face competing financial demands from medical expenses that constrain technology investment. The findings also suggest that the Chinese active aging technology market remains in an early phase, where older adults have not yet formed clear mental models linking specific health conditions to specific technological interventions.

The substitution effect of co-residence with adult children, as predicted by Andersen's Behavioral Model, was clearly demonstrated. Respondents living with children expressed approximately 12.6% lower willingness to invest, indicating that informal caregiving arrangements function as economic substitutes for technology-based independence support. This finding resonates with the emphasis on family support in Chinese long-term care norms and has important implications for market segmentation: technology marketing should particularly target older adults living alone or with aging spouses, who lack readily available informal support.

Privacy concerns, though consistently negative in sign, exerted a relatively modest effect on willingness to invest. This pattern may reflect a generational cohort effect among Chinese older adults, who may place greater trust in institutional data handling than younger cohorts, or it may indicate that the privacy questions in the contingent valuation scenario were not sufficiently salient relative to health and independence benefits. As active aging technologies collect increasingly sensitive health and behavioral data, privacy governance may become a more decisive factor in adoption decisions.

Implications for Active Aging and Physical Independence

The willingness-to-invest estimates carry several actionable implications for policy and practice. The gap between mean willingness (CNY 194) and prevailing market prices for comparable services (typically CNY 300-800 monthly) indicates a significant affordability constraint for the majority of urban older adults. Long-term care insurance schemes should consider income-tested copayment structures that subsidize technology access for lower-income respondents with high health need. Such targeting would advance the "active aging for all" equity objective while maintaining fiscal sustainability.

Digital competence training represents a complementary policy lever. The 29% willingness gap between high and low digital competence groups suggests that even with subsidies, digitally inexperienced older adults may underutilize available technologies. Community-based digital literacy programs integrated into senior university curricula and health center activities could address this barrier. Training should specifically target device operation confidence and troubleshooting skills, as these capabilities directly affect perceived ease of use and, through it, economic valuation.

Product tiering strategies should reflect the substantial incremental value hierarchy observed across service packages. Basic safety functions elicited CNY 117 monthly willingness, health monitoring added CNY 47, and full connectivity added another CNY 30. Technology firms should prioritize accessible entry-level safety packages as customer acquisition tools, subsequently upselling health monitoring and connectivity features. This tiered approach mirrors successful strategies in other technology markets and accommodates heterogeneous budget constraints across the older adult population.

From a theoretical standpoint, the findings contribute to the ongoing integration of technology acceptance and health behavior models. While TAM and PMT have been applied separately to older adult technology adoption, this study demonstrates their complementary value in explaining economic commitment rather than mere adoption intention. The substantially larger effect of perceived usefulness relative to perceived ease of use suggests that for high-stakes health technologies, functional value dominates usability concerns, a pattern that may not hold for lower-stakes consumer technologies. This finding supports calls for domain-specific theoretical adaptation rather than wholesale application of general technology acceptance frameworks to health technology contexts (Liu et al., 2023).

The present findings also contribute to the emerging literature on the economics of aging and technology. Leng et al. (2024) examined older adults' preferences for long-term caregivers in China using discrete choice experiments, finding strong preferences for family care over institutional alternatives. The present study extends this work by quantifying the economic value of a technology-based alternative to human caregiving. The mean willingness to invest of CNY 194 monthly, while substantial relative to pension incomes, represents only a fraction of the cost of institutional care or full-time home care assistance. From a social welfare perspective, subsidizing active aging technologies may be cost-effective if they delay institutionalization by even a few months. Formal cost-effectiveness analysis incorporating technology costs, health outcomes, and care transition probabilities represents an important direction for future research. Collectively, the present findings highlight affordability and digital-competence disparities among urban older adults. These practical insights carry clear relevance for advancing SDG 10 (Reduced Inequalities) by mitigating technology-driven social exclusion, as well as SDG 3 (Good Health and Well-being) by fostering inclusive health via active-ageing digital solutions for older populations

The policy implications extend beyond China to other rapidly aging middle-income countries confronting similar challenges of long-term care financing and technology-enabled independence support. In India, the Ayushman Bharat Digital Mission (ABDM) has established an integrated digital health infrastructure supporting universal health access, with the national telemedicine service e-Sanjeevani facilitating over 276 million teleconsultations by mid-2024, demonstrating substantial government investment in digital health accessibility for older adults (NITI Aayog, 2024). However, despite this infrastructure expansion, the economic valuation of active aging technologies from the user perspective remains underexplored, particularly for technologies targeting physical independence maintenance rather than general telemedicine access.

Brazil presents a contrasting case where the "Living Without Limits" (Viver Sem Limites) national plan has directed substantial funding toward assistive technology innovation, including the Program for Innovation in Assistive Technology, which has provided over BRL 175 million in funding for solutions supporting independent living among older adults and people with disabilities (AARP International, n.d.). Recent qualitative research on daily smartphone use among Brazilian older adults further reveals that technology serves as "a window to the world" for identity construction and social engagement, yet digital literacy gaps and sensorimotor impairments continue to constrain effective utilization (Gallo et al., 2024). These findings align with the present study's emphasis on digital competence as a threshold resource for technology valuation.

Indonesia's community-based care model, implemented through village-level community care hubs (Posyandu Lansia), has recently integrated digital platforms such as SILANI—a web-based assessment tool expanded into a comprehensive digital care plan system for monitoring higher-risk seniors. Recent empirical research in Indonesia further demonstrates that declining health conditions among older adults significantly affect their intention to use biometric-based self-service technology, though facilitating conditions and behavioral intentions remain the primary drivers of sustained use (Kumalasari et al., 2024). This case illustrates how digital technology can improve service coordination and case management efficiency, though rural connectivity gaps and low digital literacy among older adults remain significant implementation barriers (Wu, 2025). The contingent valuation methodology demonstrated in the present study provides a transferable template for demand assessment in these diverse contexts, though cultural adaptation of scenarios, bid levels, and service descriptions would be essential to capture local willingness-to-invest patterns accurately.

Limitations

Several limitations should inform the interpretation of these findings. The cross-sectional design precludes causal inference; the observed associations between digital competence, health status, and willingness to invest may be confounded by unobserved factors such as cognitive ability, technology exposure history, or social network composition. The contingent valuation method, while standard in non-market valuation research, captures stated preferences that may deviate from actual market behavior. The DBDC format and protest response handling mitigate but do not eliminate hypothetical bias. The exclusive focus on urban older adults limits generalizability to rural populations, who face substantially different resource constraints, lower digital connectivity, and distinct family support structures. Finally, the high positive response rate (90.9%) may partly reflect social desirability bias or insufficiently challenging bid levels, though pilot testing and protest response analysis partially addressed this concern.

Conclusions

Urban Chinese older adults demonstrate meaningful demand for technologies supporting physical independence, with mean monthly willingness to invest of CNY 194 for a comprehensive active aging technology package. This demand is shaped by the interplay of budget constraints, health need, technology perceptions, and digital capability. Perceived usefulness and household income emerge as the strongest predictors, while digital competence functions as a critical moderating factor that amplifies or attenuates the translation of positive technology attitudes into economic commitment.

Significant heterogeneity exists across age, digital competence, and income dimensions. Younger and more digitally capable respondents express substantially higher willingness, while those co-residing with adult children show reduced demand, reflecting informal care substitution. The gap between expressed willingness and prevailing market prices indicates that realizing the vision of technology-enabled active aging will require parallel investment in affordability (through targeted subsidies), accessibility (through digital literacy training), and trust (through transparent privacy governance).

Future research should employ longitudinal designs to track how willingness to invest evolves as the active aging technology market matures and user familiarity increases. Extension to rural populations represents another priority, given the substantially different resource and connectivity contexts outside major cities. Discrete choice experiments offering attribute-level tradeoffs would further illuminate preference structures, while revealed preference studies comparing stated willingness with actual adoption decisions would strengthen the behavioral validity of contingent valuation findings in this domain.

Several methodological innovations in this study deserve replication and extension. The integration of contingent valuation with technology acceptance and health behavior theory provides a template for demand assessment that can be adapted to other technology types and populations. The two-part econometric framework appropriately handles the substantial proportion of zero and protest responses that characterize older adult technology valuation. The use of instrumental variables to address measurement error in digital competence offers a strategy for improving estimate reliability in cross-sectional studies where objective skill measures are unavailable. Future research should build on these foundations to develop a more complete picture of how older adults across diverse contexts value technologies that support their independence, dignity, and quality of life.

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References

AARP International. (n.d.). Brazil: Aging readiness and competitiveness. https://www.aarpinternational.org/initiatives/aging-readiness-competitiveness-arc/brazil

Albarqi, M. N. (2024). Exploring the effectiveness of technology-assisted interventions for promoting independence in elderly patients: A systematic review. Healthcare, 12(21), 2105. https://doi.org/10.3390/healthcare12212105

Andersen, R. M. (1995). Revisiting the behavioral model and access to medical care: Does it matter? Journal of Health and Social Behavior, 36(1), 1–10. https://doi.org/10.2307/2137284

Bateman, I. J., Carson, R. T., Day, B., Hanemann, M., Hanley, N., Hett, T., ... & Sugden, R. (2002). Economic valuation with stated preference techniques: A manual. Edward Elgar Publishing.

Chen, K., & Lou, V. W. Q. (2020). Measuring senior technology acceptance: Development of a brief, 14-item scale. Innovation in Aging, 4(3), igaa016. https://doi.org/10.1093/geroni/igaa016

Cruzat, E., & Tauda, M. (2025). Actividad fisica y envejecimiento saludable: Revision sistematica de evidencia en cohortes prospectivas. Retos, 74, 63–85. https://doi.org/10.47197/retos.v74.117489

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. MIS Quarterly, 13(3), 319–340. https://doi.org/10.2307/249008

Ferrer, P., Serra, N., Garnacho, M. V., Faundez, M., Serra, M., Palomera, E., & Girabent, M. (2025). Desarrollo y validacion del cuestionario de actividad fisica para adultos de 65 anos y mayores (PAQ-EA): Herramienta de evaluacion integral. Retos, 74, 96–108. https://doi.org/10.47197/retos.v74.116558

Flores-Tena, M. J., Deocano-Ruiz, Y., Llamas-Salguero, F., & Jimenez-Morales, J. (2024). Active aging with leisure and free time activities for a better quality of life. Retos, 51, 1496–1501. https://doi.org/10.47197/retos.v51.99972

Frishammar, J., Essen, A., Bergstrom, F., & Ekman, T. (2023). Digital health platforms for the elderly? Key adoption and usage barriers and ways to address them. Technological Forecasting and Social Change, 189, 122319. https://doi.org/10.1016/j.techfore.2023.122319

Gallo, A. M., Laranjeira, C., Araújo, J. P., Marques, F. R. D. M., Baccon, W. C., Salci, M. A., & Carreira, L. (2024). The experiences of daily smartphone use among older adults in Brazil: A grounded theory analysis. Heliyon, 10(15), e35120. https://doi.org/10.1016/j.heliyon.2024.e35120

Hanemann, M., Loomis, J., & Kanninen, B. (1991). Statistical efficiency of double-bounded dichotomous choice contingent valuation. American Journal of Agricultural Economics, 73(4), 1255–1263. https://doi.org/10.2307/1242453

Kim, S., Chow, B. C., Park, S., & Liu, H. (2023). The usage of digital health technology among older adults in Hong Kong and the role of technology readiness and eHealth literacy: Path analysis. Journal of Medical Internet Research, 25(1), e41915. https://doi.org/10.2196/41915

Kumalasari, R. A. D., Rahardjo, K., Kusumawati, A., & Sunarti, S. (2024). Biometric-based self-service technology adoption by older adult: Empirical evidence from pension fund sector in Indonesia. Cogent Business & Management, 11(1), Article 2325543. https://doi.org/10.1080/23311975.2024.2325543

Kwan, R. Y. C., Yeung, J. W. Y., Lee, J. L. C., & Lou, V. W. Q. (2023). The association of technology acceptance and physical activity on frailty in older adults during the COVID-19 pandemic period. European Review of Aging and Physical Activity, 20, Article e24. https://doi.org/10.1186/s11556-023-00334-3

Leng, A., Liu, J., Maitland, E., Li, S., Nicholas, S., Ma, B., & Wang, J. (2024). Older adults preferences for long-term caregivers in China: A discrete choice experiment. Public Health, 231, 158–165. https://doi.org/10.1016/j.puhe.2024.03.022

Liu, J. Y. W., Sorwar, G., Rahman, M. S., & Hoque, M. R. (2023). The role of trust and habit in the adoption of mHealth by older adults in Hong Kong: A healthcare technology service acceptance (HTSA) model. BMC Geriatrics, 23, 73. https://doi.org/10.1186/s12877-023-03779-4

Mitchell, R. C., & Carson, R. T. (1989). Using surveys to value public goods: The contingent valuation method. Resources for the Future.

Navalon, R., & Martinez, I. (2020). Valoracion del grado de deterioro funcional y fragilidad en adultos mayores activos. Retos, 38, 576–581. https://doi.org/10.47197/retos.v38i38.78252

NITI Aayog. (2024). Senior care reforms in India: Health technology and digital care ecosystem. Government of India. https://www.niti.gov.in/sites/default/files/2024-02/Senior%20Care%20Reforms%20in%20India%20FINAL%20FOR%20WEBSITE_compressed.pdf

Rogers, R. W. (1975). A protection motivation theory of fear appeals and attitude change. Journal of Psychology, 91(1), 93–114. https://doi.org/10.1080/00223980.1975.9915803

Shao, Z., Ho, J. S. Y., Truong, N. X., My, D. V., & Tan, G. W. H. (2026). Taking charge of my health in my way! Exploring consumers' continuous usage intention and brand loyalty toward health wearable devices: A hybrid method of PLS-SEM and artificial neural network. International Journal of Mobile Communications, 27(1), 25–51. https://doi.org/10.1504/ijmc.2026.150469

Shi, H., Qi, H., & Yang, K. (2025). Enhancing elderly care with smart homes: A comparative study of use and payment willingness. Digital Health, 11. https://doi.org/10.1177/20552076251374223

Singh, N., Misra, R., Singh, S., Rana, N. P., & Khorana, S. (2022). Assessing the factors that influence the adoption of healthcare wearables by the older population using an extended PMT model. Technology in Society, 71, 102126. https://doi.org/10.1016/j.techsoc.2022.102126

Venkatesh, V., Thong, J. Y., & Xu, X. (2012). Consumer acceptance and use of information technology: Extending the unified theory of acceptance and use of technology. MIS Quarterly, 36(1), 157–178. https://doi.org/10.2307/41410412

World Health Organization. (2002). Active ageing: A policy framework. WHO.

Wu, Y. (2025). Integrating AI·IoT-OAHPs with existing elderly care systems. Digital Health, 11, Article 20552076251317378. https://doi.org/10.1177/20552076251317378

Yuan, Y.-P., Tan, G. W. H., & Ooi, K.-B. (2022). Does COVID-19 pandemic motivate privacy self-disclosure in mobile fintech transactions? A privacy-calculus-based dual-stage SEM-ANN analysis. IEEE Transactions on Engineering Management, 71, 2986–3000. https://doi.org/10.1109/TEM.2022.3204285

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