



Trust, Technology Acceptance, and Social Support in Older Adults’ Adoption of Smart Home Elderly-Care Services

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Abstract

Smart home elderly-care services can support ageing in place, yet favorable evaluations of a technology do not automatically become adoption intentions. This study integrates technology acceptance, multidimensional trust, and social support and tests the framework with complete questionnaire data from 512 Chinese adults aged 60–86 years. Twelve three-item scales were assessed on five-point response formats. Composite-score ordinary least squares models controlled for age, gender, education, income, and location; indirect effects were estimated with 5,000 bootstrap resamples. Perceived ease of use positively predicted trust ($\beta = .147$, $p = .001$), whereas perceived usefulness did not after adjustment ($\beta = .080$, $p = .098$). Perceived risk reduced trust ($\beta = -.213$, $p < .001$), while intergenerational, community, and institutional support increased it. Behavioral intention was positively associated with usefulness ($\beta = .302$), price value ($\beta = .202$), trust ($\beta = .144$), and intergenerational support ($\beta = .083$), and negatively associated with risk ($\beta = -.095$). Trust carried significant indirect effects from ease of use and all three support dimensions, but not from usefulness. Neither the support interactions nor a proposed quadratic intergenerational-support effect was significant. The results identify trust as a selective, rather than universal, conversion mechanism and suggest that support primarily establishes baseline confidence instead of amplifying already favorable evaluations. The cross-sectional design supports association, not causation.

Keywords: Behavioral intention, Older adults, Smart home elderly care, Technology acceptance, Trust, Social support.

1. Introduction

Population ageing has increased demand for care arrangements that combine safety, health monitoring, emergency response, and independent living at home. Smart home elderly-care services (SHECS) integrate connected devices with digital platforms and human service systems. Their technical promise is substantial, but adoption remains uneven because older adults must evaluate not only functionality but also effort, affordability, privacy, provider reliability, and the availability of help. Systematic reviews accordingly describe acceptance as a socio-technical problem rather than a simple product-choice decision (Vrančić et al., 2024; Y. Wang et al., 2025). Technology acceptance research emphasizes perceived usefulness and perceived ease of use (Davis, 1989) and later adds performance expectations, social influence, and facilitating conditions (Venkatesh et al., 2003, 2012). These models remain valuable, yet they do not fully explain how a favorable evaluation becomes a willingness to rely on an eldercare system. In a home-care context, the user delegates consequential tasks to devices, providers, and data-governance arrangements. Trust therefore becomes a plausible conversion mechanism between evaluation and intention (McKnight et al., 2002; Pavlou, 2003). Social support further changes the practical meaning of adoption. Family members may assist with learning; communities may provide demonstrations and troubleshooting; institutions may reduce uncertainty through standards and redress. However, support may work in more than one way. It may directly build confidence, or it may amplify the influence of usefulness and trust. Distinguishing these mechanisms is important because the managerial response differs: a direct-resource mechanism calls for dependable assistance, whereas moderation would imply targeted assistance at particular decision stages. This study tests an integrated framework using 512 complete questionnaires from adults aged 60 years and older. It contributes by evaluating multidimensional trust alongside three forms of social support, by separating

direct, indirect, interaction, and nonlinear claims, and by reporting unsupported hypotheses rather than treating every form of support as beneficial in the same way.

2. Theoretical Background and Hypotheses

2.1. Technology Evaluations and Trust

Perceived usefulness is the degree to which a user expects a service to improve valued outcomes, while perceived ease of use concerns the effort required to learn and operate it (Davis, 1989). In later life, ease also includes error recovery, accessibility, and the ability to obtain help. Task-technology fit captures whether the service matches everyday care tasks, price value compares benefits with financial burden, and perceived risk captures possible privacy, financial, functional, or safety losses. Recent studies continue to find that usefulness, trust, and value are important in older adults’ acceptance of smart-home and intelligent-care systems, although effect sizes vary by context and technology (Sorwar et al., 2023; Z. Wang et al., 2025; Yang et al., 2025).

Trust reduces residual uncertainty after a user has assessed potential benefits and costs. The questionnaire represents trust with three three-item facets and a nine-item composite. This operationalization recognizes that confidence in an eldercare service is not exhausted by a single product judgment. Because easy-to-use systems provide more predictable interactions, ease of use should strengthen trust; usefulness should do so by making promised benefits credible; risk should weaken trust.

- H₁: Perceived usefulness is positively associated with multidimensional trust.
- H₂: Perceived ease of use is positively associated with multidimensional trust.
- H₃: Perceived risk is negatively associated with multidimensional trust.

2.2. Social Support and Behavioral Intention

Intergenerational support supplies emotional reassurance, information, and hands-on assistance. Community support can make benefits observable through demonstrations and provide nearby troubleshooting. Institutional support can lower uncertainty through standards, subsidies, privacy rules, and complaint procedures. Research on Chinese older adults links intergenerational relationships with smart-home willingness and shows that technology perception and trust can transmit the effect of intergenerational support on online health-care intentions (Wei et al., 2023; Jin and Qu, 2025).

Trust should increase behavioral intention because it lowers the perceived vulnerability involved in relying on a connected service. Technology evaluations may also retain direct effects: usefulness, task fit, and price value should encourage intention, whereas risk should discourage it. Social support may both build trust directly and condition how usefulness or trust is translated into intention. The latter possibility follows the buffering tradition in social-support research (Cohen and Wills, 1985), but it requires explicit interaction tests rather than inference from positive main effects.

- H₄: Intergenerational, community, and institutional support are positively associated with multidimensional trust.
- H₅: Multidimensional trust is positively associated with behavioral intention.
- H₆: Technology evaluations are associated with behavioral intention in the expected directions: usefulness, ease of use, task fit, and price value positively, and risk negatively.
- H₇: Trust transmits the associations of usefulness, ease of use, and social support with behavioral intention.
- H₈: Social support strengthens the usefulness-to-trust and trust-to-intention associations.

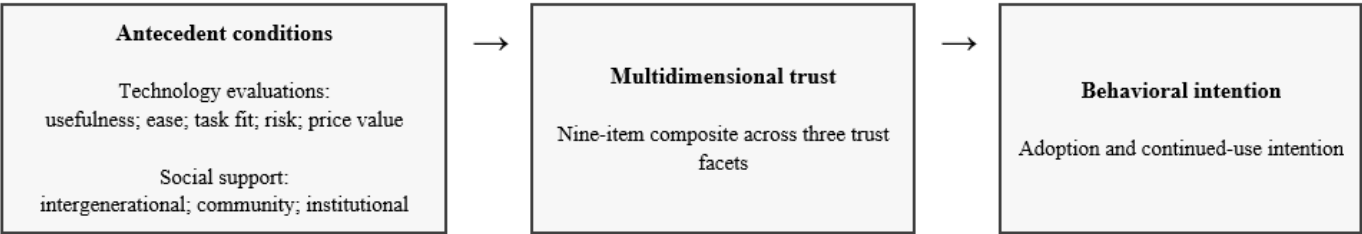


Figure 1. Tested framework for smart home elderly-care adoption.

Note: Solid paths represent the core direct-and-indirect framework. Direct antecedent-to-intention paths, support interaction terms, and a quadratic support term were also estimated. All elements are editable Word objects.

3. Research Methodology

3.1. Data and Sample

The analytic dataset contained 512 unique respondents from two coded urban locations in China. All respondents were aged 60 years or older (M = 68.89, SD = 5.78, range = 60–86). The dataset had no missing item responses and no duplicate respondent identifiers. Gender, education, income, and location were retained as supplied categorical controls. Because the accompanying file did not contain a category codebook, the analysis did not assign substantive labels to category numbers or infer location names.

3.2. Measures

The questionnaire contained 36 substantive items, each scored from 1 to 5. Perceived ease of use (PEOU), perceived usefulness (PU), task-technology fit (TTF), perceived risk (Risk), price value (PV), intergenerational support (IS), community support (CS), institutional support (INST), and behavioral intention (BI) were each measured with three items. Multidimensional trust was represented by three three-item facets (AT, BT, and IT), combined into a nine-item composite. Scale scores were calculated as item means. Internal consistency was assessed with Cronbach’s alpha.

3.3. Analytical Strategy

The analysis used composite-score ordinary least squares regression. All focal variables were standardized before estimation, so the reported coefficients are standardized betas. The trust model included the five technology evaluations and three support dimensions; the behavioral-intention model additionally included trust. Both models controlled for age, gender, education, income, and location. Indirect effects were estimated with 5,000 nonparametric bootstrap resamples. Interaction terms were calculated from standardized components. A mean-centred squared term for intergenerational support was estimated separately to evaluate the previously proposed nonlinear claim. Variance inflation factors (VIFs) were inspected for multicollinearity. A one-factor exploratory diagnostic was also calculated, but it is treated only as a limited common-method check rather than proof that bias is absent.

4. Results

4.1. Measurement Quality and Descriptive Statistics

All scale means were close to the response midpoint, ranging from 2.96 to 3.04. Cronbach’s alpha ranged from .780 to .849, exceeding the conventional .70 threshold. The nine-item trust composite had $\alpha = .849$, and behavioral intention had $\alpha = .802$. The first unrotated factor accounted for 20.72% of total item variance. The maximum VIF in the focal regression models was 1.55. These diagnostics do not indicate a severe single-factor or multicollinearity problem, although common-method bias cannot be ruled out in a single-source cross-sectional survey.

Table 1. Descriptive statistics and internal consistency (N = 512).

Construct	Items	Mean	SD	α
Perceived ease of use (PEOU)	3	3.014	1.028	0.831
Perceived usefulness (PU)	3	3.000	1.025	0.816
Task-technology fit (TTF)	3	3.005	1.014	0.835
Perceived risk (Risk)	3	3.028	0.989	0.825
Price value (PV)	3	3.037	1.025	0.823
Intergenerational support (IS)	3	2.991	1.019	0.832
Community support (CS)	3	3.017	1.049	0.839
Institutional support (INST)	3	3.015	1.008	0.798
Trust facet AT	3	3.012	1.001	0.813
Trust facet BT	3	2.958	0.988	0.780
Trust facet IT	3	3.016	1.007	0.818
Multidimensional trust	9	2.995	0.793	0.849
Behavioral intention (BI)	3	3.035	1.005	0.802

4.2. Main Effects

The trust model was significant, $F = 13.22$, $p < .001$, explaining 25.7% of the variance (adjusted $R^2 = .237$). Perceived ease of use positively predicted trust ($\beta = .147$, $p = .001$), supporting H2. Perceived usefulness was positive but not significant after adjustment ($\beta = .080$, $p = .098$), so H1 was not supported. Perceived risk had the largest absolute coefficient and negatively predicted trust ($\beta = -.213$, $p < .001$), supporting H3. Intergenerational ($\beta = .187$), community ($\beta = .151$), and institutional support ($\beta = .097$) each positively predicted trust; H4 was therefore supported for the trust outcome.

The behavioral-intention model was significant, $F = 16.71$, $p < .001$, with $R^2 = .320$ (adjusted $R^2 = .301$). Trust was positively associated with intention ($\beta = .144$, $p = .001$), supporting H5. Usefulness ($\beta = .302$, $p < .001$), price value ($\beta = .202$, $p < .001$), and intergenerational support ($\beta = .083$, $p = .043$) were positive, whereas risk was negative ($\beta = -.095$, $p = .015$). Ease of use, task-technology fit, community support, and institutional support had no independent direct effect. H6 was therefore partially supported.

Table 2. Standardized regression results.

Predictor	Trust β	t	p	Intention β	t	p
Perceived usefulness	0.080	1.656	0.098	0.302	6.538	<0.001
Perceived ease of use	0.147	3.253	0.001	0.076	1.738	0.083
Task-technology fit	0.068	1.603	0.109	-0.017	-0.422	0.673
Perceived risk	-0.213	-5.384	<0.001	-0.095	-2.432	0.015
Price value	0.003	0.062	0.951	0.202	5.171	<0.001
Intergenerational support	0.187	4.473	<0.001	0.083	2.033	0.043
Community support	0.151	3.673	<0.001	-0.006	-0.158	0.875
Institutional support	0.097	2.340	0.020	0.020	0.506	0.613
Multidimensional trust	—	—	—	0.144	3.358	0.001

Note: Standardized OLS coefficients. Both models control for age, gender, education, income, and location. Trust model: $R^2 = .257$, adjusted $R^2 = .237$, $F = 13.22$, $p < .001$. Intention model: $R^2 = .320$, adjusted $R^2 = .301$, $F = 16.71$, $p < .001$.

4.3. Indirect, Interaction, and Nonlinear Effects

Bootstrap estimates showed a significant indirect effect of ease of use on intention through trust (effect = .021, 95% CI [.006, .042]). The indirect effects of intergenerational, community, and institutional support were also significant. The indirect effect of usefulness was not significant because its confidence interval included zero. H7 was therefore partially supported: trust transmitted ease-of-use and support associations, but not the usefulness association.

Table 3. Bootstrap indirect effects through multidimensional trust.

Antecedent	Effect	95% CI low	95% CI high	Inference
Perceived usefulness	0.011	−0.002	0.030	Not significant
Perceived ease of use	0.021	0.006	0.042	Significant
Intergenerational support	0.027	0.010	0.049	Significant
Community support	0.022	0.007	0.041	Significant
Institutional support	0.014	0.001	0.031	Significant

Note: Percentile confidence intervals from 5,000 nonparametric bootstrap resamples. An indirect effect is significant when the interval excludes zero.

None of the six interaction terms was significant. For usefulness-to-trust, the interaction coefficients were .039 with intergenerational support ($p = .349$), .002 with community support ($p = .957$), and $-.030$ with institutional support ($p = .482$). For trust-to-intention, the corresponding coefficients were $-.028$ ($p = .486$), .005 ($p = .900$), and .020 ($p = .622$). H8 was not supported. The centred intergenerational-support squared term was also nonsignificant for trust ($\beta = .020$, $p = .601$) and intention ($\beta = -.005$, $p = .893$). The data therefore do not support an inverted-U claim.

Table 4. Summary of hypothesis tests.

Hypothesis	Tested relationship	Conclusion
H1	Usefulness $\rightarrow$ trust (+)	Not supported
H2	Ease of use $\rightarrow$ trust (+)	Supported
H3	Risk $\rightarrow$ trust (−)	Supported
H4	Three support dimensions $\rightarrow$ trust (+)	Supported
H5	Trust $\rightarrow$ intention (+)	Supported
H6	Technology evaluations $\rightarrow$ intention	Partially supported
H7	Indirect effects through trust	Partially supported
H8	Support moderation	Not supported

5. Discussion

5.1. Trust Is a Selective Conversion Mechanism

The strongest theoretical result is not that trust mediates everything, but that it mediates selectively. Ease of use predicted trust and had a significant trust-mediated association with intention, while usefulness retained a strong direct association with intention but did not produce a significant indirect effect through trust. Older adults may therefore separate two questions: “Will this service help me?” and “Can I safely rely on it?” Usefulness answers the first directly; usable and predictable interaction appears more relevant to the second. This distinction refines the common assumption that all favorable technology evaluations must first pass through trust.

Perceived risk was the largest negative predictor of trust and remained negatively associated with intention after trust was included. Trust and risk are therefore related but not mirror images. Building confidence does not eliminate concrete concerns about privacy, cost, malfunction, or unwanted monitoring. Providers need both trust-building signals and actual risk controls.

5.2. Support Builds Baseline Confidence Rather Than Amplifying Paths

All three support dimensions predicted trust and had significant indirect effects through trust. Yet only intergenerational support had a direct association with intention, and none of the interaction terms was significant. Support in this sample thus behaves primarily as an antecedent resource: it makes the service environment more credible, but does not make usefulness or trust more behaviorally powerful. This result cautions against using “support” as a generic moderator simply because it is theoretically plausible.

The lack of a quadratic intergenerational-support effect is equally informative. Claims that too much assistance undermines autonomy are conceptually important, but they cannot be asserted from these data. The responsible conclusion is narrower: within the observed range, intergenerational support showed a positive trust pathway and no detectable turning point. A future autonomy-substitution hypothesis would require measures of control, consent, and decision displacement rather than support intensity alone.

5.3. Critical Interpretation

The models explain 25.7% of trust and 32.0% of intention, leaving substantial variance outside the framework. This is not merely a statistical limitation; it suggests that adoption may depend on unmeasured service features such as prior failure, data sensitivity, household power relations, disability, and the credibility of the local provider. Moreover, an intention model cannot establish actual use, and a positive intention may reflect politeness or aspiration rather than willingness to install a device. The present results should therefore guide a narrower next study rather than be presented as a complete theory of eldercare adoption.

6. Implications

6.1. Theoretical Implications

The study extends technology acceptance in three ways. First, it treats trust as a selective mechanism whose relevance depends on the antecedent. Second, it separates direct support effects from interaction effects and shows that they need not coexist. Third, it distinguishes risk reduction from trust building. These refinements replace a broad “more support produces more acceptance” narrative with a testable sequence: usable interaction and credible support build trust; usefulness and price value can affect intention directly; and perceived risk independently suppresses both trust and intention.

6.2. Managerial and Policy Implications

Managers should prioritize demonstrable ease of use, transparent risk controls, and dependable support. Age-friendly onboarding should include assisted trials, error recovery, human escalation, and permission settings that remain under the older user’s control. Community and institutional actors can build baseline confidence through

local demonstrations, certification, complaint channels, and service-continuity requirements. Because price value directly predicted intention, affordability measures should be tied to real service quality rather than device distribution alone. Family assistance should be designed as reversible capability support, not permanent substitution for the user's choices.

7. Limitations and Conclusion

Several limitations define the claims that can be made. The dataset is cross-sectional and single-source, so temporal order and causality cannot be established. The locations and demographic categories were supplied as codes without a category key, limiting contextual interpretation. Composite-score regression does not test the full latent measurement structure, measurement invariance, or discriminant validity. The one-factor diagnostic is not a definitive common-method test. Actual installation and sustained-use records were unavailable. Future research should validate item wording and facet labels, use confirmatory factor analysis, collect time-separated or behavioral outcomes, and test the framework across rural and urban settings.

Smart home elderly-care adoption is not a single progression from usefulness to trust to intention. In these data, usefulness and price value were direct decision factors; ease of use and social support worked partly through trust; and perceived risk remained a separate barrier. The unsupported moderation and nonlinear results are theoretically useful because they locate the boundary of the proposed model. A credible adoption strategy should therefore make services easy to operate, demonstrably valuable, affordable, and accountable while giving older adults practical help without assuming that every form of support changes every decision pathway.

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