

Research on the Influence of Digital Technology on the Social Adaptation Level of the Elderly Empirical Analysis Based on CLASS2023

Lilin Zhao*

School of Political Science and Law, University of Jinan, Shandong, China

**Corresponding Author*

Abstract: Based on CLASS2023 data and social embedding theory, this study systematically examines the effect and mechanism of the digital technology gap on the social adaptation level of the elderly. It is found that both digital access gap and digital information gap have a significant negative impact on the social adaptation level of the elderly, and the inhibitory effect of information gap is about 5 times that of access gap. Social participation and age identity play a partial mediating role in it, and the mediating effect of social participation is higher than that of age identity ; there is significant group heterogeneity in the impact of the digital divide. Male, young and rural elderly are more vulnerable to the access gap, while female, elderly and urban elderly are more vulnerable to the information gap. The research reveals the " double threshold " mechanism and the " behavior-psychology " double-layer embedding path of digital technology embedding, which provides empirical basis and theoretical reference for improving the digital inclusion policy of the elderly and promoting active aging.

Keywords: Digital Technology; Social Adaptation; Social Participation; Age Identity

1. Introduction

By the end of 2025, China 's population aged 60 and above has reached 323.38 million, accounting for 23.0 % of the total population, and the process of deep aging has accelerated. Improving the social adaptation level of the elderly has become an important issue. Social adaptation refers to the process in which individuals adapt to changes in the social environment by changing behaviors, cognition, and emotions, reflecting the level of individual

integration, participation, and contribution to society (Helen, 2019)^[1]. Due to the decline of physiological function, the change of social role and the change of family structure, the elderly face many adaptation challenges, which affect their physical and mental health. Digital technology is profoundly reshaping their lives. From the perspective of social embedding theory, digital use is not simply a tool operation, but a practice with distinct social embedding characteristics (Granovetter, 1985)^[2]. In digital interaction, the elderly connect with families, communities, peers, etc.to expand social networks. However, the digital access gap and the information gap may exclude some elderly people from the digital dividend and aggravate the adaptation dilemma.

Based on the data of China Longitudinal Aging Social Survey (CLASS) in 2023, this study takes the social embeddedness theory as the framework, transforms the digital access gap and information gap into the ' threshold condition ' and ' quality condition ' of technology embeddedness, and takes social participation and age identity as the mediating mechanism to examine the impact of digital technology on the social adaptation of the elderly, focusing on the effect of digital divide, the mediating role of social participation and age identity and group heterogeneity, aiming to provide empirical basis for digital inclusion policy.

2. Literature Review and Research Hypotheses

2.1 The Influencing Factors of the Social Adaptation Level of the Elderly

Social adaptation is a state in which individuals achieve harmony with the social environment through psychological and behavioral adjustment. Existing studies have shown that the elderly with young age, good health, high education level and abundant economy have a

higher level of social adaptation. At the level of social environment, social support, community environment and social participation have a significant role in promoting, and the elderly-friendly community can directly improve social adaptation through the social support network. Digital technology can provide opportunities to maintain or increase social capital, and social capital decreases with age and has a positive impact on health. Therefore, attention should be paid to the use of digital technology in health interventions for the elderly. Gao, Liang and Xu (2024) used the CLASS data of 2016 and 2018 to reveal the significant vertical correlation between Internet use, social adaptation and subjective well-being of the elderly^[5]. The research of Grotto and Buja (2025) shows that there is a significant positive correlation between Internet use and cognition in the elderly, and it is conducive to social adaptation^[3]. Yan et al. (2026) pointed out that digital new media art can enhance the community participation and social adaptability of the elderly, especially for the elderly with computer experience.^[4]

From the perspective of social embeddedness theory, the social adaptation of the elderly depends essentially on the degree and quality of their embeddedness in social networks. Granovetter divides embedding into relational embedding and structural embedding : relational embedding emphasizes the constraint and empowerment of two-way interpersonal relationships on behavior, and structural embedding focuses on the impact of individual network location on resource acquisition (Granovetter, 1985)^[2]. In the digital age, the formation and maintenance of social networks are increasingly dependent on digital media, and digital technology has become a key infrastructure for the elderly to achieve social embeddedness. However, the existing literature is not sufficient to explore the internal mechanism of how digital technology affects the social adaptation of the elderly by changing the social embedding path, which provides research space for this paper.

2.2 The Impact of Digital Technology on the Level of Social Adaptation of the Elderly

Social embeddedness theory holds that individual behavior is deeply embedded in social networks (Granovetter, 1985)^[2]. For the elderly, the use of digital technology is a kind of social

embedding practice : through smart phones, social media and other interactions with families, communities and peers, they continue to expand social networks and embed new information and social scenes, so as to obtain social capital and maintain identity. From the perspective of embedding level, digital access trench determines the ' ticket ' of technology embedding, and digital information trench reflects the depth and quality of embedding. Studies have shown that Internet use can improve the level of social adaptation and subjective well-being through the dual path of information acquisition and social connection (Zhang et al., 2024)^[7].

Based on this, hypothesis 1 is proposed :

Hypothesis 1 : Digital technology has a significant negative impact on the social adaptation level of the elderly. Specifically :

Hypothesis 1a : The deeper the digital access gap, the lower the level of social adaptation of the elderly ;

hypothesis 1b : The elderly with digital information gap have lower level of social adaptation than those without digital information gap.

2.3 The Mediating Role of Social Participation

Social participation is the core way for the elderly to maintain social connection (including style, learning, exercise and volunteer activities). According to the theory of social embedding, participation is embedded in the social network, so as to obtain emotional support, information resources and identity, and then improve social adaptation. Studies have confirmed that social participation plays a mediating role between the environment of the elderly-friendly community and social adaptation. Although digital technology provides a new platform, the access and information gap may limit the opportunities for participation, so that the elderly are partially disembedded from the social network, and ultimately weaken their social adaptation. Sun and Zhou (2021) found through panel regression analysis that the elderly who use the Internet have a higher degree of social participation ^[8]; park et al. (2023) pointed out that the more active online interaction, the greater the possibility of individual participation in civic activities, suggesting that online interaction may be a potential path to expand the social participation of the elderly ^[11]; kim et al.

(2024) showed that the lower the level of social participation, the worse the digital literacy^[9]; hu et al. (2025) found that instrumental digital adaptation can improve the subjective well-being of middle-aged and elderly people in rural China, and community participation plays a partial mediating role^[10].

Based on this, hypothesis 2 is proposed :

Hypothesis 2 : Social participation plays a mediating role between digital technology and social adaptation of the elderly. Digital technology indirectly reduces the level of social adaptation of the elderly by inhibiting their social participation.

2.4 The Mediating Role of Age Identity

Social embeddedness theory also includes psychological identity dimension. Age identity is an individual 's subjective perception of their own aging, which is derived from social comparison and cultural norms, and is measured by the difference between perceived age and actual age. Positive identity can stimulate health behavior and social participation, and promote adaptation ; smart pension products improve identity by improving self-efficacy and participation. Social comparison of digital technology and self-efficacy affect age identity. Lack of skills is prone to ' sense of aging ' and ' sense of incompetence ', which strengthens negative identity. Theoretically, the digital disadvantage is internalized into negative age identity, which weakens the motivation and ability to actively adapt to society.

Based on this, hypothesis 3 is proposed :

Hypothesis 3 : Age identity plays a mediating role between digital technology and social adaptation of the elderly. Digital technology indirectly reduces the level of social adaptation of the elderly by weakening their positive age identity.

Based on the above analysis, the research framework is constructed as follows :

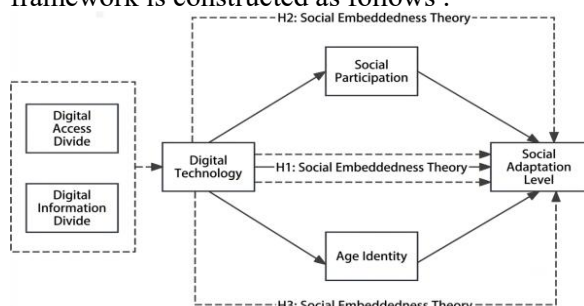


Figure 1. Research Framework Diagram

3. Research Design

3.1 Data Sources

The data were from the China Longitudinal Aging Social Survey (CLASS) organized and implemented by the Institute of Geriatrics, Renmin University of China. A total of 11,670 valid questionnaires were collected in the 2023 survey, covering information such as demographic characteristics, health status, socioeconomic status, and social support. After eliminating the missing core variables and inapplicable samples, 9346 samples were finally included in the analysis. The data is nationally representative and can effectively support the empirical analysis of the relationship between digital technology and social adaptation of the elderly in this study.

3.2 Variable Selection

3.2.1 Explained Variables

The level of social adaptation was measured according to the eight questions about social adaptation in the CLASS questionnaire (such as ' if there is an opportunity, I am willing to participate in some work of the village / neighborhood committee ', ' I often want to do something for the society ', ' I like to learn now ', etc.). Each question was scored by Likert five points (1-5 points), of which the 5th to 8th questions were reverse expression questions, and reverse coding was performed before analysis. The scores of the 8 questions were summed up to obtain a continuous variable with a value of 8-40 points. The higher the score, the better the social adaptation. The Cronbach 's α coefficient of the scale was 0.76.

3.2.2 Core Explanatory Variables

Digital technology is divided into digital access channel and digital information channel. The access trench is based on the three variables of ' whether there is a network signal in the house ', ' whether there is a lack of Internet equipment ' and ' poor network signal ', which are added together after the same direction assignment. The score is a continuous variable of 0 ~ 3, and the higher the score, the deeper the access trench. The information gap is measured by whether the ' most important source of information ' is the Internet . The value of 0 indicates that there is no information gap, and 1 indicates that there is information gap.

3.2.3 Mediator Variable

Social participation selects six activities in the

questionnaire, including religious activities, college / training courses for the elderly, watching TV / listening to radio / reading / reading newspapers / listening to dramas, singing / playing musical instruments, playing mahjong / playing chess / playing cards, and square dance. According to the frequency of participation, from 'not participating' to 'almost every day', the value is assigned to 0-4 points, and the total score is the degree of social participation.

Age identity is measured by the respondents' answer to 'how old do you think you are', and the perceived aging age is compared with the actual age. If the perceived age is greater than the actual age, it is assigned to 1 (positive identity), otherwise it is 0 (negative identity).

3.2.4 Control Variables

The control variables include age, gender, education level, household registration type, retirement status, marital status, self-rated health, number of children and average monthly household income.

3.3 Benchmark Regression Model

Based on the above research hypothesis and previous research methods, the benchmark regression model is constructed as follows:

$$Y_i = \beta_0 + \beta_1 Access_i + \beta_2 Info_i + \gamma Z_i + \varepsilon_i \quad (1)$$

Among them, Y_i denotes the level of social adaptation of the i -th respondent; $Access_i$ represents the digital access divide score; $Info_i$ is the dummy variable for the digital information divide; Z_i denotes the vector of control variables; and ε_i is the random error term. Robust standard errors are employed in all regressions to address potential heteroskedasticity.

4. Results of Empirical Analysis

4.1 Descriptive Statistics

Table 1 reports the descriptive statistical results

Table 1. Variable Coding and Descriptive Statistics

Variable	Variable Coding	Mean	SD	Min	Max
Dependent Variable					
Social Adaptation Level	Continuous variable	24.285	4.063	8.000	40.000
Independent Variables					
Digital Access Divide	Continuous variable	0.652	0.696	0.000	3.000
Digital Information Divide	1 = Has divide; 0 = No divide	0.709	0.454	0.000	1.000
Mediating Variables					
Social Participation	Continuous variable	5.881	3.641	0.000	23.000
Age Identity	Continuous variable	-0.051	12.226	-41.000	50.000
Control Variables					

of the main variables. The final effective sample size included in the analysis is 9346, which has a good national representativeness.

In terms of explanatory variables, the average social adaptation water of the elderly is 24.285 points, the standard deviation is 4.063, the value range is 8 ~ 40 points, the overall position is slightly above the middle, and there are some differences among individuals.

In terms of core explanatory variables, the average value of digital access gap is 0.652 points, and the standard deviation is 0.696. The overall access conditions are acceptable, but there are obvious differences in infrastructure and equipment accessibility among individuals. The average digital information gap is 0.709 (binary variable), indicating that about 70.9 % of the elderly do not use the Internet as the main source of information, and the information gap problem is more prominent.

In terms of mediating variables, the mean value of social participation is 5.881, the standard deviation is 3.641, the overall participation is low, and the frequency of participation in various activities needs to be improved; the mean value of age identity is -0.051, and the standard deviation is 12.226. The whole is neutral and slightly positive, but the cognitive differences between individuals are large.

In terms of control variables, the average age of the sample was 71.237 years old; males accounted for 52.9 % and females accounted for 47.1 %, with a balanced gender distribution. The overall level of education is low, mainly primary school and below; agricultural accounts accounted for 52.6 %; retirees accounted for 41.5 %; the mean score of self-rated health was 3.549, which was between 'general' and 'relatively healthy'. Married accounted for 83.6 %; the average number of children is 2.169; the average monthly household income is 8.700, and there is a certain gap in income level.

Variable	Variable Coding	Mean	SD	Min	Max
Age	Continuous variable	71.237	5.936	60.000	101.000
Age Squared	Continuous variable	5109.963	869.268	3600.000	10201.000
Gender	1 = Male; 2 = Female	1.471	0.499	1.000	2.000
Education Level	0 = Primary school or below; 1 = Junior high school; 2 = Senior high school; 3 = Junior college or above	0.561	0.770	0.000	3.000
Hukou Type	1 = Agricultural; 2 = Non-agricultural	1.474	0.499	1.000	2.000
Retirement Status	1 = Retired; 0 = Not retired	0.415	0.493	0.000	1.000
Self-Rated Health	1 = Very unhealthy; 2 = Unhealthy; 3 = Average; 4 = Healthy; 5 = Very healthy	3.549	0.765	1.000	5.000
Marital Status	1 = Married; 0 = Unmarried / Divorced / Widowed	0.836	0.370	0.000	1.000
Number of Children	Continuous variable	2.169	1.134	0.000	9.000
Log of Household Monthly Income	Continuous variable	8.700	1.229	5.136	13.218

4.2 Benchmark Regression Analysis

In order to test the impact of the digital technology gap on the social adaptation level of the elderly, this paper uses the OLS regression strategy, and Table 2 reports the estimation results of the three models.

The model (1) only included the digital access channel variable, with a coefficient of -0.347 ($p < 0.001$). Model (2) only includes the digital information gap variable, and its coefficient is - 1.099 ($p < 0.001$). The two core independent variables showed significant negative effects when they entered the model alone, which preliminarily verified the inhibitory effect of the digital divide on social adaptation, but the R^2 of the two models was less than 0.08, and the explanatory power was limited.

Model (3) includes both digital access channel and digital information channel, and adds all control variables. The results show that the coefficient of the digital access gap is - 0.208 ($p < 0.001$), and the coefficient of the digital information gap is - 1.023 ($p < 0.001$). Both of them are significant at the 1 % level, and the absolute value of the coefficient is lower than that when it is included separately, indicating that the two types of digital divide are both independent and partially overlapping.

From the perspective of social embedding theory, the above results reveal the ' double threshold ' mechanism of digital technology affecting social adaptation. The significant negative effect of the digital access gap means that when the elderly cannot achieve digital access, they are excluded from the online social network and lose the opportunity to obtain social capital through digital media, that is, they fail to complete the '

entry ' of technology embedding. The effect of the digital information gap is stronger (the coefficient is about 5 times that of the access gap), indicating that even if the access is completed, if the Internet cannot be used as the main source of information, the elderly are still in a shallow embedded state and cannot transform technology into substantive social resources.

In terms of control variables, age and its square term showed a significant ' U-shaped ' relationship, and the inflection point was about 70.6 years old, which was consistent with the ' aging paradox ' theory. The level of education showed a gradient effect : compared with the primary school and below groups, the social adaptation level of the elderly in junior high school, senior high school, college and above was 0.264, 0.923 and 1.435 points higher, respectively. Self-rated health (0.650, $p < 0.001$), family monthly income (0.228, $p < 0.001$), and retirement (0.481, $p < 0.001$) all significantly positively affected social adaptation. The type of household registration (-0.237, $p < 0.05$) showed that the social adaptation level of the elderly with agricultural household registration was significantly lower. Gender, marital status and number of children did not reach a significant level.

Combining the three models, regardless of whether the control variables are included, the digital access ditch and the digital information ditch have a significant negative impact on social adaptation. Model R^2 increased from 0.070 to 0.080, which laid the foundation for subsequent mediation mechanism and heterogeneity analysis.

Table 2. OLS Regression Analysis of Digital Technology on Older Adults' Social Adaptation Level

Variable	Model(1)	Model(2)	Model(3)
Digital Access Divide	-0.347*** (0.058)		-0.208*** (0.059)
Digital Information Divide		-1.099*** (0.108)	-1.023*** (0.110)
Age	-0.707*** (0.102)	-0.593*** (0.102)	-0.565*** (0.102)
Age Squared	0.005*** (0.001)	0.004*** (0.001)	0.004*** (0.001)
Gender	-0.022 (0.083)	-0.010 (0.082)	-0.008 (0.082)
Education Level (Ref: Primary school or below)			
Junior High School	0.328*** (0.109)	0.275** (0.109)	0.264** (0.109)
Senior High School	1.020*** (0.151)	0.920*** (0.150)	0.923*** (0.150)
Junior College or Above	1.582*** (0.283)	1.441*** (0.276)	1.435*** (0.277)
Hukou Type	-0.165 (0.121)	-0.222* (0.122)	-0.237* (0.122)
Retirement Status	0.555*** (0.128)	0.511*** (0.128)	0.481*** (0.128)
Self-Rated Health	0.698*** (0.059)	0.651*** (0.059)	0.650*** (0.059)
Marital Status	0.191 (0.119)	0.142 (0.118)	0.137 (0.118)
Number of Children	-0.022 (0.041)	-0.013 (0.041)	-0.013 (0.041)
Log of Household Monthly Income	0.229*** (0.038)	0.222*** (0.038)	0.228*** (0.038)
Constant	46.139*** (3.758)	42.382*** (3.731)	41.434*** (3.739)
Observations	9346	9346	9346
R ²	0.070	0.079	0.080

Note : The regression coefficients are presented in the table, and the data in brackets are robust standard errors, *** $p < 0.001$, ** $p < 0.05$, * $p < 0.1$, the following table is the same.

4.3 Robustness Test

In order to ensure the robustness of the benchmark conclusion, this study tests from two dimensions : replacing the explained variable and increasing the fixed effect of the province. The results are shown in Table 3.

First, replace the explained variable. The continuous scores of social adaptation were converted into binary dummy variables (higher than mean = 1, lower than mean = 0) according to the mean, and re-estimated by Logistic model. The column (1) of Table 3 shows that the coefficients of the digital access gap and the

digital information gap are still significantly negative, indicating that the suppression effect of the digital divide is not dependent on continuous measurement methods.

Second, increase the provincial fixed effect. There are differences in digital infrastructure, aging degree and public services among provinces, which may affect the accessibility of digital technology and the level of social adaptation at the same time, resulting in missing variable bias. Based on Model (3), this paper incorporates provincial dummy variables to control the time-invariant characteristics at the regional level. Column (2) of Table 3 shows

that after controlling the provincial fixed effect, the coefficients of the digital access gap and the digital information gap are -0.173 and -0.933 , respectively (both significant at the 0.001 level), and the direction is consistent with the benchmark. Compared with the benchmark model (-0.208 and -1.023), the absolute value of the coefficient increased, and the model R^2 increased from 0.080 to 0.133. This shows that

provincial factors have diluted the negative effect of the digital divide to a certain extent. After controlling regional heterogeneity, the inhibitory effect of the lack of digital technology embedding on social adaptation is more prominent, and the explanatory power of social embedding theory is strengthened from the perspective of regional comparison.

Table 3. Robustness Checks

Variable	(1)	(2)
	Replacement of Dependent Variable	Adding Province Fixed Effects
Digital Access Divide	-0.087^{***} (0.033)	-0.173^{***} (0.061)
Digital Information Divide	-0.554^{***} (0.053)	-0.933^{***} (0.112)
Control Variables	Controlled	Controlled
Observations	9346	9346
R^2	0.046	0.133

4.4 Heterogeneity Analysis

In order to test the group differences in the impact of digital technology, this paper selects three dimensions of gender, age and household registration for group regression. The results are shown in Table 4.

In terms of gender, the negative impact of digital access channel on men (-0.239 , $p < 0.001$) is greater than that of women (-0.173 , $p < 0.05$) ; the inhibitory effect of digital information gap on women (-1.392) was about twice that of men (-0.719). The male social network is more instrumental and public, the social adaptation is more dependent on structural embedding, and the access gap threshold effect is more prominent. Women 's networks are more emotional and diffuse, and more dependent on information flow. The information gap makes it difficult to maintain weak relationships and emotional support, and the dilemma is more serious. Males are disembedded due to ' unable to access ', and females are disembedded due to ' information occlusion '.

In terms of age, the access ditch is significantly negative for the younger elderly (-0.220), and not significant for the older age group (-0.142). The inhibitory effect of the information gap on the older age group (-2.399) was much greater than that of the younger age group (-0.764). The younger elderly are still in the active

maintenance period of the network, and the access trench block structure is embedded ; most of the elderly people have been naturally disembedded, more dependent on family strong relationships, and the access gap effect has been diluted. However, the information gap has a dramatic impact on the elderly-cognitive resources have been attenuated. The Internet is the key to maintaining social comparison and self-positioning, and the lack will accelerate psychological disembedding.

In terms of household registration, the access ditch is significantly negative for agricultural household registration (-0.220), and is not significant for non-agricultural household registration ; the inhibitory effect of information gap on non-agricultural hukou (-2.399) is much greater than that of agricultural hukou (-0.764). The social adaptation of the rural elderly is embedded in the local network, and the strong relationship has certain substitutability, but the access gap makes it difficult to complete the transformation from the local embedding to the digital embedding. The urban elderly network is diversified, and the access gap can be partially compensated. However, the urban information density is high and the dependence is strong. The information gap brings more severe social comparison pressure and information deprivation, and the psychological embedding is more frustrated.

Table 4. Heterogeneity Analysis

Variable	(1)Male	(2)Female	(3)Young-Old	(4)Old-Old	(5)Agricultural Hukou	(6)Non-Agricultural Hukou
Digital Access Divide	-0.239^{***} (0.083)	-0.173^{**} (0.085)	-0.220^{***} (0.069)	-0.142 (0.115)	-0.220^{***} (0.069)	-0.142 (0.115)

Digital Information Divide	-0.719*** (0.155)	-1.392*** (0.156)	-0.764*** (0.120)	-2.399*** (0.260)	-0.764*** (0.120)	-2.399*** (0.260)
Control Variables	Controlled	Controlled	Controlled	Controlled	Controlled	Controlled
Constant	47.613*** (5.574)	34.793*** (5.019)	26.353* (14.501)	18.628 (18.442)	26.353* (14.501)	18.628 (18.442)
Observations	4946	4400	7086	2260	7086	2260
R ²	0.072	0.093	0.082	0.085	0.082	0.085

4.5 Mediation Effect Test

Bootstrap method (repeated sampling 2000 times) was used to test the mediating effect of social participation and age identity. The results are shown in table 5.

4.5.1 the Mediating Effect of Social Participation

The indirect effect of digital access communication on social participation is -0.027, the digital information gap is -0.084, and the latter is about 3.1 times that of the former, revealing the ' information dependence ' of social embedding : the access gap restricts the elderly to enter the online community, distance learning and other participation scenarios, while the information gap further cuts off the cognitive channels of obtaining activity information, maintaining weak relationships and coordinating collective action, so that participation is degraded from ' active choice ' to ' passive waiting ', and the quality of relationship embedding is reduced. The indirect effect of the two types of divide is smaller than the direct effect, indicating that the digital divide 's damage to social adaptation is not only to reduce participation behavior, but also to directly disintegrate the elderly 's belonging expectation and identity legitimacy of the digital society - a '

structural disembedding ' that cannot be completely repaired by restoring participation.

4.5.2 the Mediating Effect of Age Identity

The indirect effect of digital access communication on age identity is - 0.019, and the digital information gap is - 0.041, which is about 2.2 times that of the former. Age identity is a psychological coordinate formed by individuals through continuous social comparison and location perception in social networks. The information gap prevents the elderly from reading online news, using social media or completing online affairs, and is in an information disadvantage in intergenerational interaction, public discussion and national narrative. This structural disadvantage is internalized as a negative identity of ' I am old and unable to catch up '. The access trench only causes physical isolation, and can still maintain identity integrity through non-digital defenses such as ' I don 't need a mobile phone ' ; the information gap causes ability exposure. In the face of repeated failure of digital tasks, the elderly are forced to admit their own cognitive decline, and the defense mechanism of psychological embedding is broken down, so the intermediary path has more psychological penetration.

Table 5. Bootstrap Test Results for Mediation Pathways

Mediation Path	Effect Type	Effect Value	95% Confidence Interval
Digital Access Divide - Social Participation - Social Adaptation	Indirect Effect	-0.027***	[-0.040, -0.016]
	Direct Effect	-0.176***	[-0.289, -0.063]
Digital Information Divide - Social Participation - Social Adaptation	Indirect Effect	-0.084***	[-0.119, -0.053]
	Direct Effect	-0.936***	[-1.146, -0.710]
Digital Access Divide - Aging Age Identity - Social Adaptation	Indirect Effect	-0.019***	[-0.032, -0.008]
	Direct Effect	-0.184***	[-0.295, -0.071]
Digital Information Divide - Aging Age Identity - Social Adaptation	Indirect Effect	-0.041***	[-0.062, -0.023]
	Direct Effect	-0.978***	[-1.186, -0.759]

Note: CI = Confidence Interval. *** $p < 0.001$, ** $p < 0.05$, * $p < 0.1$.

5. Conclusion and discussion

5.1 Main Conclusions ,

Based on the data of the 2023 China Longitudinal Aging Social Survey, this study systematically examines the effect, mechanism

and group heterogeneity of the digital technology gap (digital access gap and digital information gap) on the social adaptation level of the elderly with the social embedding theory as the core analysis framework. The main conclusions are as follows :

First, the digital technology gap has a significant

negative impact on the social adaptation level of the elderly. The robustness test shows that the conclusion is still robust after replacing the explained variable and increasing the fixed effect of the province. Second, social participation and age identity play a significant partial mediating role between digital technology and social adaptation of the elderly. The mediating effect of social participation is significantly higher than that of age identity, indicating that the inhibition of digital divide on social adaptation is dominated by behavioral embedded barriers. Third, there is significant group heterogeneity in the impact of digital technology on social adaptation.

5.2 Suggestions

First of all, we should implement a differentiated digital inclusion strategy between urban and rural areas : rural areas should give priority to promoting network infrastructure construction and smart terminal subsidies, reduce the threshold of digital access, and help the elderly complete the transformation from ' local embedding ' to ' digital embedding ' ; urban areas focus on digital literacy education and information acquisition ability training, relying on community centers, universities for the elderly and other platforms to bridge the information gap and alleviate the sense of information deprivation and social comparison pressure.

Secondly, the community should actively organize online and offline social activities to repair the " behavioral disembedding " caused by the digital divide. At the same time, through the positive feedback mechanism in digital skills training, the community should help the elderly to reshape their positive age identity and resist the risk of " psychological disembedding. "

Thirdly, pay attention to the digital empowerment of vulnerable groups such as the elderly, women and rural areas, and implement targeted assistance : develop simplified applications for the elderly, deliver emotional support to the female elderly through social media and other relationship networks, and incorporate digital inclusion into the rural revitalization strategy.

Finally, promote the ' technology-policy-society ' collaborative governance, the government improves the digital aging standard and supervision system, the community establishes a normalized digital assistance mechanism, and

the family strengthens the intergenerational digital feedback, forming a multi-subject coordination, online and offline linkage governance pattern, in order to truly realize the social integration and well-being improvement of the elderly in the digital age.

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