

The Chain Effect of Social Adaptation and Attitude towards Aging between the Internet Use Ability and Depressive Symptoms of Chinese Elderly People in Urban and Rural Areas: A Cross-sectional Study

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Table of Contents

Original Manuscript..... 5

Supplementary Files..... 28

 Figures 29

 Figure 1..... 30

 Figure 2..... 31

 Figure 3..... 32

 Figure 4..... 33

 Multimedia Appendixes 34

 Multimedia Appendix 1..... 35

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Abstract

Background: Using the Internet may alleviate depressive symptoms by enhancing social connections and psychological resilience. However, its impacts through psychosocial pathways such as social adaptation and attitudes towards aging have not been fully studied, especially the analysis of urban-rural disparities.

Objective: This study examines the chain mediation effects of social adaptation and attitudes toward aging in the relationship between internet use ability and depressive symptoms among Chinese elderly, while quantifying urban-rural disparities.

Methods: Using cross-sectional data from 8,453 adults aged ≥60 in the 2023 China Longitudinal Aging Social Survey (CLASS), internet use ability was categorized via latent class analysis (LCA) into non-use, basic, practical, and advanced levels. Depressive symptoms were measured using the CES-D scale. Stepwise regression and structural equation modeling (SEM) tested associations and mediation pathways, with bootstrap validation.

Results: Urban-rural gaps were pronounced: 70.87% of urban vs. 41.54% of rural elderly used the internet, with rural users showing lower proficiency. Rural seniors also reported higher depressive symptoms (mean = 15.97 vs. 14.99, $p < 0.001$). Advanced internet use significantly reduced depressive symptoms, mediated by improved social adaptation and positive aging attitudes. Rural seniors with advanced skills exhibited stronger associations between internet use and positive aging attitudes compared to urban counterparts.

Conclusions: Internet use alleviates depressive symptoms through psychosocial pathways, and rural elderly people with strong Internet use abilities gain greater benefits. Formulating targeted policies to improve digital inclusivity, enhance social adaptability, and cultivate positive attitudes towards aging is crucial for addressing the urban-rural gap in mental health. This is also in line with China's strategy of active aging and the goal of health equity.

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Original Manuscript

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Abstract

Background: Using the Internet may alleviate depressive symptoms by enhancing social connections and psychological resilience. However, its impacts through psychosocial pathways such as social adaptation and attitudes towards aging have not been fully studied, especially the analysis of urban-rural disparities.

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Results: Urban-rural gaps were pronounced: 70.87% of urban vs. 41.54% of rural elderly used the internet, with rural users showing lower proficiency. Rural seniors also reported higher depressive symptoms (mean = 15.97 vs. 14.99, $p < 0.001$). Advanced internet use significantly reduced depressive symptoms, mediated by improved social adaptation and positive aging attitudes. Rural seniors with advanced skills exhibited stronger associations between internet use and positive aging attitudes compared to urban counterparts.

Conclusion: Internet use alleviates depressive symptoms through psychosocial pathways, and rural elderly people with strong Internet use abilities gain greater benefits. Formulating targeted policies to improve digital inclusivity, enhance social adaptability, and cultivate positive attitudes towards aging is crucial for addressing the urban-rural gap in mental health. This is also in line with China's strategy of active aging and the goal of health equity.

keywords: Internet Use Ability; Depressive symptoms; Urban-Rural; Social Adaption; Attitudes towards Aging

Introduction

Depression among the elderly is a significant public health concern, especially in an aging society like China. Due to the rapid socioeconomic changes and the transformation of family structures, the mental health of the elderly has become increasingly vulnerable [1]. Among this group, depressive symptoms are associated with a decline in quality of life, an increase in morbidity, and a higher utilization rate of healthcare services [2,3,4]. As digital technology has become an indispensable part of daily life, internet use has emerged as a potential tool to alleviate depressive symptoms by enhancing social connections, information access, and psychological resilience [5,6]. However, influenced by socioeconomic status, educational attainment, and the level of exposure to technology, there are disparities in the internet use ability of the elderly, which may exacerbate the existing mental health inequalities [7]. Meanwhile, the urban-rural inequalities in digital infrastructure and digital literacy still persist[8], raising questions about how internet use may have different impacts on the mental health of different populations.

Social adaptation, defined as the ability to adapt to social changes and maintain meaningful interpersonal relationships, plays a crucial role in shaping the mental health outcomes of the elderly [9]. A strong social adaptation ability can cultivate a sense of belonging and purpose, thus providing protection against depressive symptoms [10]. At the same time, attitudes towards aging, such as self-perception of aging and acceptance of physical or cognitive decline, significantly affect emotional well-being[11,12]. Negative attitudes towards aging are closely related to depressive symptoms, while positive attitudes can enhance psychological resilience and adaptive coping strategies [13,14,15]. Despite these understandings, the interplay among internet use ability, social adaptation, and attitudes towards aging has not been fully explored, especially in the context of China's urban-rural gap.

Existing studies have highlighted the multifaceted nature of the elderly's internet use, which encompasses activities such as social interaction, entertainment, learning, and health management[16]. Notably, previous research has often treated internet use as a one-dimensional concept,

overlooking the diversity of usage patterns, and has further discussed the possible different associations between internet use ability and mental health outcomes. In addition, few studies have explored how internet use ability mediates or moderates the relationship among social adaptation, attitudes towards aging, and depressive symptoms, especially in rural areas with limited resources. Given the significant urban-rural disparities in infrastructure, accessibility of healthcare services, and socioeconomic opportunities in China[17], it is of utmost importance to supplement and refine this research area.

This study aims to fill the gaps in existing research by analyzing the chain effect of social adaptation and attitudes towards aging in the relationship between internet use ability and depressive symptoms among Chinese elderly people, with a focus on urban-rural disparities. By adopting a cross-sectional research design, we seek to: (1) assess the association between internet use ability and depressive symptoms; (2) examine the mediating roles of social adaptation and attitudes towards aging; (3) quantify the contributions of observable and unobservable factors to urban-rural disparities. Through the application of stepwise linear regression and structural equation model analysis, this study provides nuanced insights into the mechanisms underlying depressive symptoms among the elderly population.

The research findings will provide a reference for formulating targeted intervention measures to enhance digital inclusivity, promote the formation of adaptive attitudes towards aging, and improve mental health conditions, especially in underserved rural communities. This is in line with national initiatives such as the "Healthy China 2030" strategy, which emphasizes the equitable distribution of health resources and the integration of technology into elderly care[18].

Materials and methods

Study population

The research subjects are from the China Longitudinal Aging Social Survey (CLASS) carried out by the National Survey Research Center and the Center for Population and Development Studies at Renmin University of China. The CLASS is a biennially longitudinal survey with national representativeness, which is conducted in 28 provinces (autonomous regions and municipalities) in mainland China, covering 134 counties (districts and county-level cities) and 462 villages (urban communities). The CLASS targets randomly selected individuals aged 60 and above. After informing each participant of the survey instructions and obtaining their informed consent, face-to-face interviews are conducted with them. This study analyzes the latest publicly available data in 2023, which involves 8,453 Chinese elderly people (Age ≥ 60 years old).

Variables

Depressive symptoms

This study measured depressive symptoms using the Chinese version of the Center for Epidemiologic Studies Depression (CES-D) scale[19]. The CES-D measures an individual's depressive symptoms in the past two weeks from a total of nine items, including six negative symptoms and somatic symptoms (loneliness, sadness, worthlessness, boredom, loss of appetite, and insomnia) and three positive symptoms (happiness, enjoyment of life, and pleasure).

Responses were scored on a three - point Likert - type scale (0=rarely, 1=sometimes, 2=most of the time). We reverse - scored the positive symptoms and then summed the item scores. The total score for depressive symptoms ranged from 0 to 18, with a higher score indicating a higher risk of depression. The CES-D scale has been widely validated among Chinese older adults(In this study Cronbach's=0.73)[20,21].

Internet Use Ability

The use of the Internet consists of 11 items in total: voice chat, text chat, shopping, read news, browse articles other than news, audio-visual entertainment, games, transportation and travel, health management, financial management, and learning. All these are binary variables, with a response of "Yes=1" and "No=0".We used latent class analysis (LCA) to classify the elderly who use the Internet in order to analyze and derive their different levels of Internet usage capabilities.

Social Adaptation

The social adaptation level of the elderly was measured in two dimensions, social development adaptation and spiritual and cultural adaptation, using a social adaptation scale[22]. This scale includes eight questions that measure the elderly's social adaptation level by asking about their willingness to participate in the work of the village committee/residents' committee, their willingness to contribute to society, whether they like to learn, whether they feel useful to society, whether they adapt to social changes, their acceptance of modern social views, their acceptance of new social policies, and their views on social changes. The responses are all on a 5-point Likert scale, namely "completely disagree", "relatively disagree", "average", "relatively agree", and "completely agree", with each option assigned values from 0 to 4 in order. The score range is 10-40, and a higher score indicates a stronger social adaptation ability of the elderly(In this study, Cronbach's=0.76).

Attitudes towards Aging

Seven items from the currently most commonly-used Attitudes to Aging Questionnaire (AAQ) were adopted to measure the sample's attitudes towards aging from three dimensions: psychosocial loss, physical change experience, and psychological gain[23,24]. Psychosocial loss includes items such as "Because of my age, I feel that I'm being pushed aside" and "In my view, growing old is a process of continuous loss". Physical change experience includes "I feel that I'm already old" and "After getting old, I find it harder to make new friends". Psychological gain includes "The older people are, the stronger their ability to handle life problems is", "Wisdom grows with age", and "There are many pleasant things about getting old". The responses were all on a five-level Likert scale from "completely disagree" to "completely agree". After reverse- scoring the four questions belonging to the psychosocial loss and physical change experience dimensions, the scores of the three dimensions were accumulated to obtain the total score of attitudes towards aging. A higher score indicates a more positive attitude towards aging(In this study Cronbach's =0.71).

Covariates

Demographic characteristic were included in the model as covariates for control, including age, gender (male=1, female=0), household registration (urban = 1, rural = 0), and marital status (married with a spouse=1, widowed=2, divorced

or never-married=3). We also controlled for socioeconomic status, including the total monthly household income (in logarithmic form to reduce heteroscedasticity) and educational attainment (illiterate=0, primary school education or below=1, junior high school=2, secondary technical school education or above=3). Based on the experience of previous studies[25,26], we controlled for the elderly's physical health indicators, including Activities of Daily Living (ADL, measured by the Katz Index) and whether they had been diagnosed with chronic diseases(yes=1, No=0).

Statistical analysis

This study mainly used Stata 18 software for data processing and analysis, and set the significance level at $p < 0.05$ (two-tailed test). Conduct an analysis of the 11 options related to the Internet using latent class analysis(LCA), and through fitting, obtain the different stages of the elderly's Internet use ability. First, a descriptive analysis was conducted, and the one - way analysis method was used to analyze the differences in all variables between urban and rural groups. Subsequently, a multiple regression analysis was carried out to examine the relationships among the main variables. After confirming the significant associations among the measured variables, a mediation analysis was performed using the structural equation model to explore the mediating roles of social adaptation and attitudes towards aging between Internet use ability and depressive symptoms. To estimate the mediation effects, the bootstrap method was adopted to test the significance of the standardized coefficients.

Results

Sample characteristics

Table 1 presents the results of the descriptive analysis of the sample. We included 8,453 elderly individuals with a mean age of 71.25 years (standard deviation: 6.23). Among them, 56.36% of the elderly could use the Internet. The score for depressive emotion assessment was 15.48 (standard deviation: 6.23), the score for social adaptation was 24.50 (standard deviation: 3.94), and the score for attitude towards aging was 20.16 (standard deviation: 3.60). The results of the univariate analysis showed that the differences between urban and rural areas were statistically significant($p < 0.05$). Table 1 also shows the survey-weighted demographic characteristics of the included participants. Among these participants, 51.60% were men, 49.47% were rural elderly, 14.17% had a secondary vocational school degree or above, and 73.75% suffered from chronic diseases.

Table1 Sample characteristics

The ability to use the Internet

We performed a latent class analysis on a sample of Internet - using individuals ($N = 4767$). During the latent variable analysis, when the sample's Internet usage was classified into three categories, the values of the AIC and the BIC exhibited a distinct inflection point. Furthermore, in comparison with the two-category and four-category settings, the three-category model had the highest Entropy value, and the Lo - Mendell-Rubin adjusted likelihood ratio test (LMR) was significant at the 1% level. Thus, through comprehensive evaluation, the optimal latent class was determined to be three.

Figure 1 illustrates the conditional probabilities of the manifest variables corresponding to the three latent categories. The first category of elderly individuals demonstrated the highest usage frequencies for voice chatting and audio-visual entertainment in Internet use, constituting approximately 34.3% of the sample. They primarily mastered two relatively easy to operate Internet functions, yet their proficiency in other digital skills was extremely low. We term this category "basic-level use". The second category of elderly people further acquired Internet skills such as text chatting, reading news and articles, etc. We designate this as "practical use", which accounted for 53.3% of the sample. The proportion of the third category of elderly Internet users was the lowest, around 12.4%. Building upon the various digital skills mastered by the practical life oriented Internet users, they additionally mastered digital skills including shopping, gaming, transportation related applications, health management, financial management, etc. Moreover, the probabilities of using other digital skills were almost invariably higher than those of the other two categories of elderly Internet users. Hence, this paper labels this category "advanced - level use". In conclusion, there are ultimately four types of Internet usage: non - use, basic - level use, practical use, and advanced-level use.

Figure1 The conditional response probabilities of each factor in the latent class analysis

Table 2 shows the basic situation and urban-rural differences of the grouping of Internet usage capabilities after the latent class analysis. Overall, the proportion of rural elderly people using the Internet (42.54%) is significantly lower than that of urban elderly people (70.87%), and the Internet usage capabilities of urban elderly people are also higher than those of rural elderly people.

Table2 Urban-rural comparison of the ability to use the Internet

The correlation between Internet use ability and depressive symptoms and the differences between urban and rural areas

Table 3 presents the results of the stepwise regression analysis for the full sample. Both unadjusted and adjusted models indicate that different Internet use abilities show significant positive correlations with older adults' social adaptation($p < 0.05$), but no significant correlation with positive aging attitudes. Social adaptation demonstrates significant positive correlations with positive aging attitudes and significant negative correlations with depressive symptoms($p < 0.05$). Aging attitudes exhibit significant negative correlations with depressive symptoms($p < 0.05$). Supplementary Table S1 presents the results of the stepwise regression analyses stratified by urban and rural residence. For both urban and rural older adults, different levels of internet use ability showed significant positive correlations with social adaptation and significant negative correlations with depressive symptoms($p < 0.05$). For both urban and rural older adults, social adaptation was significantly positively correlated with positive aging attitudes and significantly negatively correlated with depressive symptoms($p < 0.05$), while positive aging attitudes were also significantly negatively correlated with depressive symptoms($p < 0.05$). Regarding the relationship between internet use ability and aging attitudes, compared with urban older adults, rural older adults with advanced

internet use skills exhibited a significant positive correlation with positive aging attitudes($p < 0.05$).

Table3 Conduct a stepwise regression to test the correlation between core variables.

The mediating effects of social adaptation and attitudes towards aging and the differences between urban and rural areas

Figure 2 shows the results of the structural equation model for the entire sample. The equation has a good fitting effect (RMSEA = 0.019, CFI = 0.994, TLI = 0.971, SRMR = 0.006). The standardized coefficients show that, compared with the elderly who do not use the Internet, using the Internet can significantly inhibit the depressive symptoms of the elderly, and as the Internet use ability of the elderly improves, the inhibitory effect on depressive symptoms becomes stronger (The standard coefficient are -0.067, -0.115, and -0.192 in sequence, $p < 0.05$). Whether it is basic-level use, practical use or advanced use, it will positively predict the social adaptation ability of the elderly, promote the elderly's positive attitude towards aging, and thus inhibit the depressive symptoms of the elderly. Different levels of Internet use ability can also affect the depressive symptoms of the elderly by regulating social adaptation. We further differentiated between urban and rural areas and explored the mediating paths of social adaptation and attitude towards aging in the relationship between Internet use ability and depressive symptoms. Figure 3 presents the results of the structural equation model. Judging from the values of the fitting indices, the equations show a good fitting effect. Compared with urban elderly people, rural elderly people who use the Internet at an advanced level have a more positive attitude towards aging, thus reducing the risk of depression.

Table 4 shows the serial effects obtained after the bootstrap (rep=1000) analysis, regardless of whether they are urban or rural elderly people. As the ability to use the Internet improves, the serial effects gradually increase (The sequential mediating effects are -0.015, -0.038, and -0.063 in sequence, $p < 0.05$). Among rural elderly people, the effects of practical and advanced-level Internet use in suppressing the risk of depression through social adaptation and attitude towards aging are significantly greater than those among urban elderly people. The supplementary material Table S2 shows in detail the total effects, direct effects and indirect effects of each path obtained after the bootstrap method.

Figure2

Figure3

Table4

Discussion Principal Findings

This study elucidates the chain mediation effects of social adaptation and attitudes toward aging in the relationship between internet use ability and depressive symptoms among Chinese older adults, with a focus on urban-rural disparities. Key findings indicate that internet use ability significantly alleviates depressive symptoms by enhancing social adaptation, which subsequently fosters more positive attitudes toward aging. Notably, rural older adults with advanced internet skills demonstrated a stronger association between internet use and positive aging attitudes compared to their urban counterparts. This suggests that digital inclusion may yield disproportionately greater psychosocial benefits in resource-limited settings.

The study reveals that 41.54% of rural older adults use the internet, significantly lower than the proportion among urban older adults (70.87%). These findings align with prior research on Chinese older adults [8,16], though slightly lower than rates observed in developed Western countries [27,28,29]. Previous studies, such as those by Xu[30] and others, have documented urban-rural disparities in internet use among older adults. Our research further identifies that rural older adults exhibit lower overall internet proficiency. Latent class analysis (LCA) revealed distinct patterns: among urban older adults, "practical use" was the most common category (40.39%), while "advanced use" was the least prevalent (10.07%). In rural areas, the proportions of "basic use" (18.27%) and "practical use" (19.46%) were comparable but notably low overall. Strikingly, the proportion of rural older adults using the internet (41.54%) approximates that of urban older adults classified as "practical users" (40.39%), underscoring pronounced urban-rural disparities in internet use capabilities.

Regarding depressive symptoms, descriptive analyses showed higher scores among rural older adults (mean = 15.97, SD = 3.28) than urban older adults (mean = 14.99, SD = 3.46), consistent with findings from Liu[15]. Scholars argue that rural older adults in China face weaker social support systems, higher prevalence of "empty-nest" households, and monotonous lifestyles, rendering them more vulnerable to depressive symptoms [31,32,33,34]. Conversely, urban older adults, despite encountering greater life stressors and negative life events, may benefit from stronger social adaptation (mean = 24.90, SD = 3.84) and more positive aging attitudes (mean = 20.25, SD = 3.71) compared to rural older adults (social adaptation: mean = 24.09, SD = 4.01; aging attitudes: mean = 20.07, SD = 3.49), which buffer mental health risks [35,36].

Stepwise regression analysis showed that among both urban and rural elderly people, internet use ability was positively correlated with social adaptation and attitudes towards aging, and was significantly negatively correlated with depressive symptoms. Social adaptation was significantly positively correlated with attitudes towards aging and negatively correlated with depressive symptoms, while attitudes towards aging were also negatively correlated with depressive symptoms. These results confirmed the potential mediating pathways and were consistent with the existing literature [13,15,35,37], which suggests that internet use can enhance social adaptation ability and promote the formation of positive attitudes towards aging, thereby improving mental health conditions. Our study extends prior work by employing latent class analysis (LCA) to categorize internet use ability, revealing that higher proficiency in internet use amplifies benefits for achieving active aging.

While existing studies have identified social adaptation—particularly factors

related to social capital—as a mediator between internet use and depressive symptoms, our study constructs a chain mediation model, demonstrating that social adaptation and aging attitudes sequentially mediate this relationship. These findings resonate with evidence on the mental health benefits of internet use for older adults, particularly through improved social support and participation [35,38,39,40]. The mediating role of social adaptation reinforces the importance of social integration in aging populations [37], while the link between internet use and positive aging attitudes expands research on technology's role in reshaping self-perceptions of aging [5,13,41]. These factors not only mediate the relationship between internet use and depressive symptoms but also act as protective factors for mental health, suppressing the risk of depression.

Overall, the impact of internet use ability on depressive symptoms was stronger among urban older adults than rural older adults. The observed urban-rural disparities echo debates on the digital divide [8,30], where rural populations face structural barriers to technology access but may experience amplified psychosocial benefits when these barriers are addressed [42]. Notably, rural older adults with advanced internet skills derived greater mental health benefits, underscoring a "compensatory amplification effect": internet use compensates for structural disadvantages (e.g., social isolation, limited healthcare access), thereby magnifying its psychological impact [17,30]. These disparities highlight the contextual vulnerability of rural populations and emphasize the need for tailored interventions to bridge digital and mental health inequities.

Strengths and Limitations

This study utilized data from the latest wave (2023) of the nationally representative China Longitudinal Aging Social Survey (CLASS) to assess the association between internet use ability and depressive symptoms among older adults, while exploring the sequential mediating effects of social adaptation and aging attitudes and analyzing urban-rural disparities. However, several limitations should be acknowledged. First, the cross-sectional design limits our ability to infer causality, as temporal relationships between variables cannot be established. Future research should employ longitudinal cohort data to clarify the directionality of these associations. Second, although validated self-reported measures were used, they may introduce response biases. Third, the study did not account for unobserved confounding factors, such as cultural norms or community-level dynamics, which might influence the observed relationships. Future studies could incorporate mixed-methods approaches to explore these contextual factors and adopt experimental or quasi-experimental designs to strengthen causal claims.

Conclusions

The regression analysis and structural equation model in this study indicate that social adaptation and attitudes towards aging have a serial mediating effect between the internet use ability of urban and rural elderly people and their depressive symptoms. In addition, the internet use ability of urban elderly people is higher than that of rural elderly people. However, a stronger association between internet use ability and positive attitudes towards aging is

observed among rural elderly people, highlighting the potential of digital inclusion in resource-limited environments.

This study has enhanced our understanding of how internet use ability affects the depressive symptoms of the elderly through psychosocial mediating factors, while also highlighting the persistent urban-rural disparities. These research findings provide a new perspective on understanding the urban-rural disparities in the association between internet use ability and depressive symptoms among Chinese elderly people, and also offer valuable guidance for formulating or refining relevant policies. The specific policy strategies include the following points: (1) Improve the internet use ability of the elderly in rural areas to maximize the psychosocial benefits; (2) Pay attention to the mental health issues of rural elderly people; (3) Actively promote the social adaptation ability and attitudes towards aging of the elderly through various means. These strategies and policies will help to integrate the "Healthy China 2030" strategy with the goals of digital inclusion, so as to address structural inequalities and ensure that the rural elderly population can receive more support in terms of accessing technology and enjoying mental health services.

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Data Availability

The China Longitudinal Aging Social Survey(CLASS) is a large-scale, national and continuous social survey project. It is initiated by the Institute of Gerontology of Renmin University of China and jointly organized and implemented by the Survey Data Center of Renmin University of China and the Population and Development Research Center of Renmin University of China. This database is accessible to the public. For specific application information, please refer to:

<http://class.ruc.edu.cn/index.htm>.

Authors Contributions

Chenyu developed the research concepts, acquired the data, conducted all statistical analyses, and wrote this paper. Wenwen, Yiran, Ning, Le, and Wenxin contributed to writing and reviewing this paper. Wannian provided suggestions for revision and was responsible for obtaining the fund, Hong provided statistical expertise and supervision. All authors reviewed the final paper.

Conflicts of Interest

None declared.

Supplementary Materials

The supplementary materials provide a table of the stepwise regression results by urban and rural areas, as well as a detailed table of the structural equation model results by urban and rural areas.

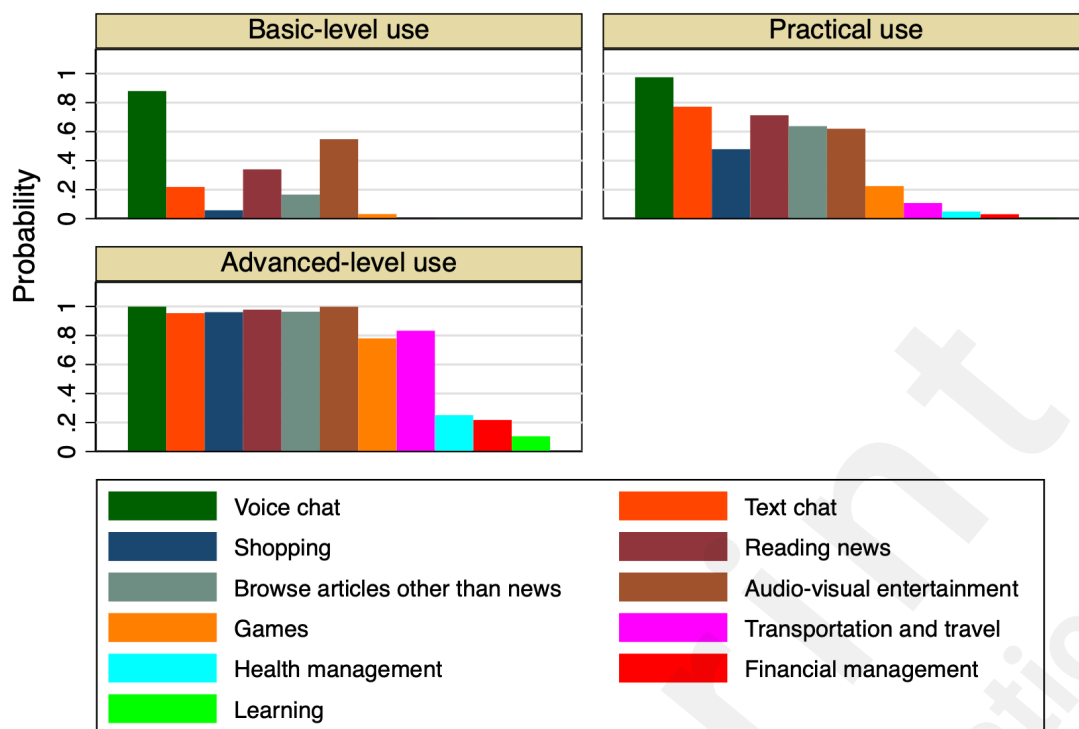
References

1. Banerjee D. 'Age and ageism in COVID-19': Elderly mental health-care vulnerabilities and needs. *Asian J Psychiatr.* 2020;51:102154. doi: 10.1016/j.ajp.2020.102154. PMID: 32403024; PMCID: PMC7198430.

2. Bilotta, C., Casè, A., Nicolini, P., et al. Social vulnerability, mental health and correlates of frailty in older outpatients living alone in the community in Italy. *Aging Mental Health*. 2010;14(8), 1024–1036. <https://doi.org/10.1080/13607863.2010.508772>.
3. Ng T, Niti M, Tan W, Cao Z, Ong K, Eng P. Depressive Symptoms and Chronic Obstructive Pulmonary Disease: Effect on Mortality, Hospital Readmission, Symptom Burden, Functional Status, and Quality of Life. *Arch Intern Med* 2007;167(1):60–67. doi:10.1001/archinte.167.1.60.
4. Liao, W., Luo, Z., Dong, X. et al. Associations between depressive symptoms, anxiety symptoms, their comorbidity and health-related quality of life: a large-scale cross-sectional study. *BMC Public Health* ,2021;21:1911. <https://doi.org/10.1186/s12889-021-11969-1>.
5. Fang, Y., Chau, A. K. C., Wong, A., et al. Information and communicative technology use enhances psychological well-being of older adults: the roles of age, social connectedness, and frailty status. *Aging Mental Health* 2017;22(11), 1516–1524. <https://doi.org/10.1080/13607863.2017.1358354>.
6. Choi NG, DiNitto DM. Internet Use Among Older Adults: Association With Health Needs, Psychological Capital, and Social Capital. *J Med Internet Res* 2013;15(5):e97doi: 10.2196/jmir.2333.PMID: 23681083.PMCID: 3668603.
7. Mu, A., Deng, Z., Wu, X. et al. Does digital technology reduce health disparity? Investigating difference of depression stemming from socioeconomic status among Chinese older adults. *BMC Geriatr* 2021,21, 264. <https://doi.org/10.1186/s12877-021-02175-0>.
8. Nie W, Hu M, Ye X. Internet use and rural-urban mental health inequalities: Evidence from China. *Front Public Health*. 2023;11:1-6.<https://doi.org/10.3389/fpubh.2023.1107146>.
9. Sharifian N, Sol K, Zahodne LB, Antonucci TC. Social Relationships and Adaptation in Later Life. *Comprehensive Clinical Psychology*. 2022:52–72. doi: 10.1016/B978-0-12-818697-8.00016-9. PMCID: PMC7500884.
10. Chanokruthai C, Reg Arthur W, Bonnie M. H. The Role of Sense of Belonging and Social Support on Stress and Depression in Individuals With Depression. *Arch Psychiatr Nurs*. 2005,19(1):18-29.<https://doi.org/10.1016/j.apnu.2004.11.003>.
11. Velaithan V, Tan MM, Yu TF, et al. The Association of Self-Perception of Aging and Quality of Life in Older Adults: A Systematic Review. *Gerontologist*. 2024;64(4):gnad041. doi:10.1093/geront/gnad041.
12. Cheng, S.-T., Fung, H. H., Chan, A. C. M. Self-perception and psychological well-being: The benefits of foreseeing a worse future. *Psych Aging*. 2009,24(3): 623–633. <https://doi.org/10.1037/a0016410>.
13. Choi EY, Um S, Shin H, Kim YS. Attitudes toward aging, active coping, and depressive symptoms among middle-aged and older Korean adults: How do they differ by age group? *J Affect Disorders*. 2022,296:380–7. <https://doi.org/10.1016/j.jad.2021.09.086>.
14. Jeste DV, Savla GN, Thompson WK, et al. Association Between Older Age and More Successful Aging: Critical Role of Resilience and Depression. *American J Psych*. 2013;170(2):188-196. doi:10.1176/appi.ajp.2012.12030386.
15. Liu D, Xi J, Hall BJ, et al. Attitudes toward aging, social support and depression among older adults: Difference by urban and rural areas in China. *J Affect Disorders*. 2020;274:85-92. doi:10.1016/j.jad.2020.05.052.

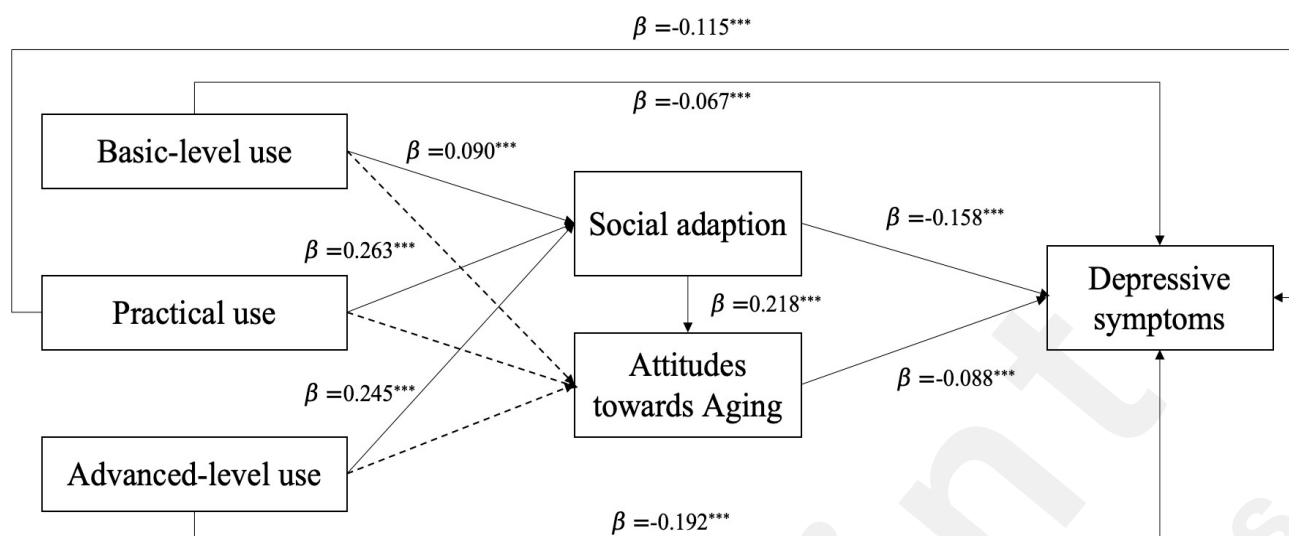
16. Yu X, Ang S, Zhang Y. Exploring Rural-Urban Differences in the Association Between Internet Use and Cognitive Functioning Among Older Adults in China. *J of Geront: Series B*. 2024;79(4):gbad195. doi:10.1093/geronb/gbad195.
17. Ma, C.; Song, Z.; Zong, Q. Urban-Rural Inequality of Opportunity in Health Care: Evidence from China. *Int. J. Environ. Res. Public Health* 2021, 18, 7792. <https://doi.org/10.3390/ijerph18157792>.
18. Liu X., Tang H. Health system strengthening in China: progress, challenges and ways forward. *BRICS Health J*. 2024;1(1):59-70. <https://doi.org/10.47093/3034-4700.2024.1.1.59-70>.
19. Jin H, Zhiyan C, Fei G et al. A short Chinese version of center for epidemiologic studies depression scale. *Chin J Behav Med Brain Sci* 2013;22:1133-6.
20. Li, C., Jiang, S., Zhang, X. Intergenerational relationship, family social support, and depression among Chinese elderly: A structural equation modeling analysis. *J Affect Disorders*, 2019,248:73-80. <https://doi.org/10.1016/j.jad.2019.01.032>.
21. Li, J., Zhou, X. Internet use and Chinese older adults' subjective well-being (SWB): The role of parent-child contact and relationship. *Comput Hum Behav*,2021,119: 106725. <https://doi.org/https://doi.org/10.1016/j.chb.2021.106725>.
22. Chen Bo. Say No to "Ageing is a Problem": The Current Situation and Countermeasures of Social Adaptation of Older Adults. Beijing: Beijing Normal University Publishing Group,2010:288-294.
23. Laidlaw K, Power M J, Schmidt S. The Attitudes to Ageing Questionnaire(AAQ):Development and Psychometric Properties. *Inter J Geriatric Psych* 2007;22(4):367-379.
24. Gao, L., Laidlaw, K. Wang, D. A brief version of the Attitudes to Ageing Questionnaire for older Chinese adults: development and psychometric evaluation. *BMC Psych* 2024,12, 181. <https://doi.org/10.1186/s40359-024-01691-z>.
25. Ma, Y., Xiang, Q., Yan, C. et al. Relationship between chronic diseases and depression: the mediating effect of pain. *BMC Psych* 2021, 21, 436. <https://doi.org/10.1186/s12888-021-03428-3>.
26. Jilili M, Liu L. Examining the impact of functional disability and cognitive impairment on mental health of Chinese elderly. *Social Work in Health Care*. 2022;61(5):338-352. doi:10.1080/00981389.2022.2091080.
27. van Boekel LC, Peek ST, Luijkx KG. Diversity in Older Adults' Use of the Internet: Identifying Subgroups Through Latent Class Analysis. *J Med Internet Res* 2017;19(5):e180. doi: 10.2196/jmir.6853. PMID: 28539302. PMCID: 5463053.
28. Lam SSM, Jivraj S, Scholes S. Exploring the Relationship Between Internet Use and Mental Health Among Older Adults in England: Longitudinal Observational Study. *J Med Internet Res* 2020;22(7):e15683. doi: 10.2196/15683. PMID: 32718913. PMCID: 7420689.
29. Luo Y, Yip PS, Zhang Q. Positive association between Internet use and mental health among adults aged ≥ 50 years in 23 countries. *Nat Hum Behav*. 2025;9(1):90-100.
30. Xu J, Zhang Q. The relationship between internet use and mental health of

- the elderly: analysis of the differences between urban and rural. Plos one. 2023 Jan 26;18(1):e0280318.
31. Dengguo Z, Zhijun Y. The health inequalities research of empty nesters under the background of urbanization and occupational mobility. In 2015 International Conference on Social Science and Technology Education 2015 Apr (pp. 170-172). Atlantis Press.
 32. Xu S, Yang X, Liu J, Chong MK, Cheng Y, Gong W, Zou G. Health and wellbeing among the empty nest and non-empty nest elderly in China—results from a national cross-sectional study. Plos one. 2023 Sep 12;18(9):e0291231. <https://doi.org/10.1371/journal.pone.0291231>.
 33. Xie LQ, Zhang JP, Peng F, Jiao NN. Prevalence and related influencing factors of depressive symptoms for empty-nest elderly living in the rural area of Yongzhou, China. Arch Gerontol Geriatr. 2010;50(1):24-29. doi:10.1016/j.archger.2009.01.003.
 34. Zhang C, Xue Y, Zhao H, et al. Prevalence and related influencing factors of depressive symptoms among empty-nest elderly in Shanxi, China. J Affect Disorders. 2019;245:750-756. doi:10.1016/j.jad.2018.11.045.
 35. Zhang C, Zhang S, Niu Q. A New Perspective of Urban-Rural Differences: The Impact of Social Support on the Mental Health of the Older Adults: A Case from Shaanxi Province, China. Healthcare. 2021; 9(2):112. <https://doi.org/10.3390/healthcare9020112>.
 36. Verheij RA. Explaining urban-rural variations in health: A review of interactions between individual and environment. Soc Sci Med. 1996;42(6):923-935. doi:10.1016/0277-9536(95)00190-5.
 37. Chen W chao, and Wang X yan. The contribution of audiobook use on the mental health of older adults: the mediating effects of social adaptation. Aging Mental Health. 2024;28(5):754-761. doi:10.1080/13607863.2023.2281634.
 38. Cutrona, C., Russell, D., & Rose, J. Social support and adaptation to stress by the elderly. Psych Aging, 1986 1(1), 47-54. <https://doi.org/10.1037/0882-7974.1.1.47>.
 39. Tomioka, K., Kurumatani, N. Hosoi, H. Positive and negative influences of social participation on physical and mental health among community-dwelling elderly aged 65–70 years: a cross-sectional study in Japan. BMC Geriatr 17, 111 (2017). <https://doi.org/10.1186/s12877-017-0502-8>.
 40. Chen J, Zeng Y, Fang Y. Effects of social participation patterns and living arrangement on mental health of Chinese older adults: A latent class analysis. Front Public Health. 2022;10. <https://www.frontiersin.org/journals/public-health/articles/10.3389/fpubh.2022.915541>.
 41. An, J., Zhu, X., Wan, K. et al. Older adults' self-perception, technology anxiety, and intention to use digital public services. BMC Public Health 24, 3533 (2024). <https://doi.org/10.1186/s12889-024-21088-2>.
 42. Correa T, Pavez I. Digital Inclusion in Rural Areas: A Qualitative Exploration of Challenges Faced by People From Isolated Communities. Journal of Computer-Mediated Communication. 2016;21(3):247-263. doi:10.1111/jcc4.12154.



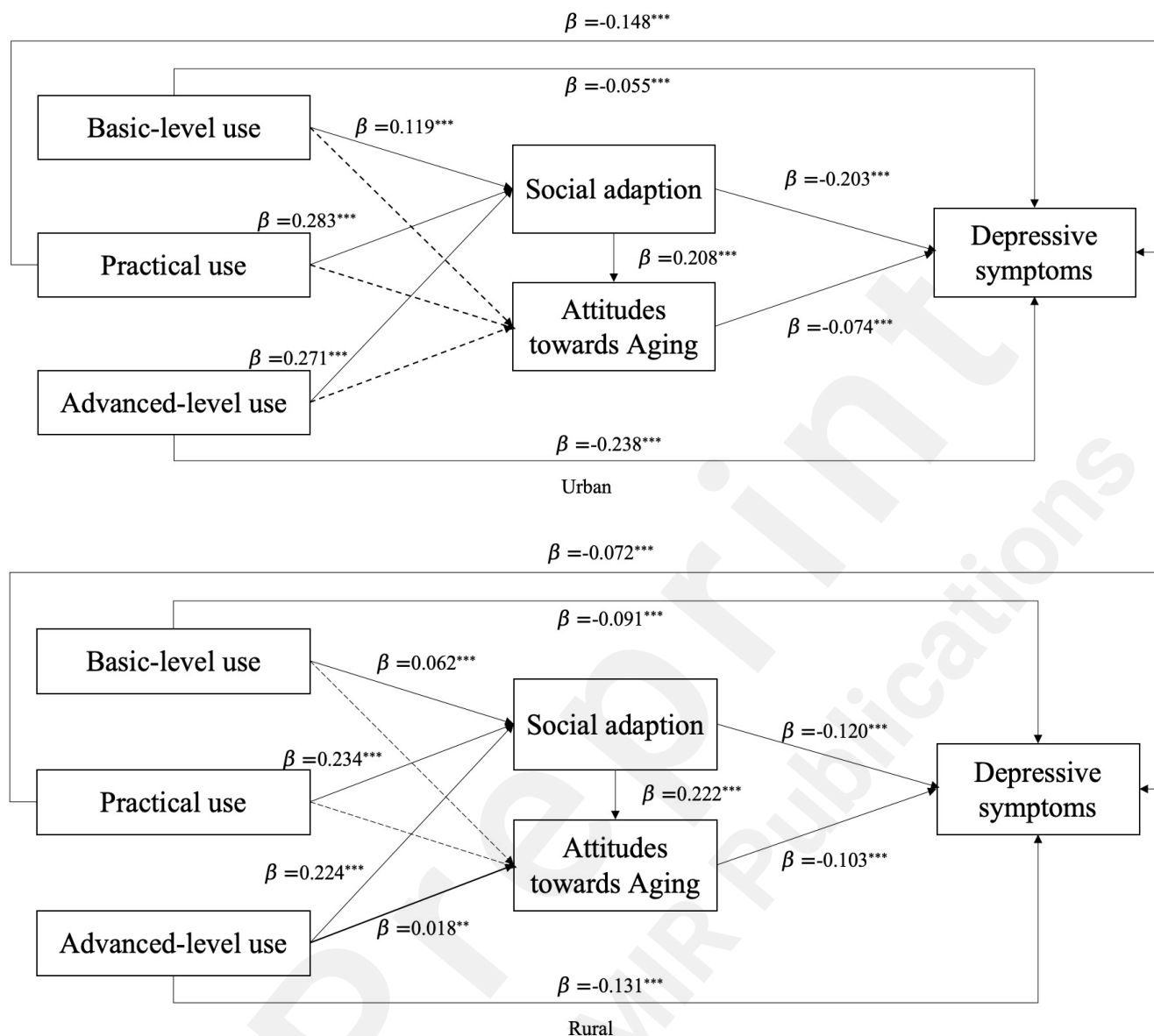
Graphs by LatentClass

Figure 1 The conditional response probabilities of each factor in the latent class analysis

Figure 2 The chain mediating path between the Internet use ability and

depressive symptoms, with social adaptation and attitude towards aging serving as mediators.

Note: RMSEA=0.019, CFI=0.994, TLI=0.971, SRMR=0.006. The solid line indicates significance at the 5% level, and the dashed line indicates non-significance. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Figure 3 Urban-rural differences in the chain mediation between Internet use

ability and depressive symptoms, with social adaptation and attitude towards aging serving as mediators.

Note: Model fitting indices for the urban sample: RMSEA=0.037, CFI=0.984, TLI=0.905, SRMR=0.009; Model fitting indices for the rural sample:

RMSEA=0.015, CFI=0.997, TLI=0.980, SRMR=0.006. The solid line indicates

significance at the 5% level, and the dashed line indicates non-significance. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table1 Sample characteristics

	All sample		Urban sample4271		Rural sample4182		T/X^2
	Mean/N	SD/%	Mean/N	SD/%	Mean/N	SD/%	
Depressive symptoms	15.48	3.41	14.99	3.46	15.97	3.28	13.34***
Social adaption	24.50	3.94	24.90	3.84	24.09	4.01	-9.54***
Attitude towards aging	20.16	3.60	20.25	3.71	20.07	3.49	-2.21*
Age	71.25	6.23	70.75	6.04	71.76	6.39	7.52***
Household income	10876.68	16710.12	15343.05	20203.24	6586.973	10857.73	-36.47***
ADL score	0.20	0.74	0.22	0.75	0.18	0.74	-2.44**
Internet use							
Yes	4764	56.36	3027	70.87	1737	41.54	739.45***
No	3689	43.64	1244	29.13	2445	58.46	
Gender							
Female	4091	48.40	2141	50.13	1950	46.63	10.36***
Male	4362	51.60	2130	49.87	2232	53.37	
Education							
Illiterate	1463	17.31	416	9.74	1047	25.04	12.03***
Primary school education or below	3478	41.15	1352	31.66	2126	50.84	
Junior high school	2314	27.37	1491	34.91	823	19.68	
Secondary technical school education or above	1198	14.17	1012	23.69	186	4.45	
Marital status							
Married	7024	83.09	3657	85.62	3367	80.51	40.18***
Widowed	1330	15.73	567	13.28	763	18.24	
Divorced or never-married	99	1.17	47	1.10	52	1.24	
The number of people living together							
0	680	8.04	279	6.53	401	9.59	32.94***
=1	5459	64.58	2854	66.82	2605	62.29	
≥2	2314	27.37	1138	26.64	1176	28.12	
Chronic disease							
Yes	6234	73.75	3176	74.36	3058	73.12	
No	2219	26.25	1095	25.64	1124	26.88	1.68

Note: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table2 Urban-rural comparison of the ability to use the Internet

	All sample		Urban sample		Rural sample		X^2
	N	%	N	%	N	%	
Not use at all	3689	43.64	1244	29.13	2445	58.46	848.84***
Basic-level use	1636	19.35	872	20.42	764	18.27	
Practical use	2539	30.04	1725	40.39	814	19.46	
Advance use	589	6.97	430	10.07	159	3.80	

Note: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$



Table3 Conduct a stepwise regression to test the correlation between core variables.

	Social adaption		Attitude towards aging		Depressive symptoms	
	Unadjusted	Adjusted	Unadjusted	Adjusted	Unadjusted	Adjusted
Internet Use Ability						
Basic-level use	0.849*** [0.632,1.066]	0.862*** [0.630,1.093]	0.144 [-0.057,0.344]	0.018 [-0.196,0.231]	-0.750*** [-0.932,-0.567]	-0.511*** [-0.704,-0.319]
Practical use	2.429*** [2.237,2.621]	2.102*** [1.876,2.328]	0.071 [-0.110,0.252]	-0.258* [-0.469,-0.048]	-1.287*** [-1.457,-1.116]	-0.740*** [-0.937,-0.544]
Advanced-level use	3.937*** [3.623,4.251]	3.604*** [3.259,3.949]	-0.079 [-0.402,0.243]	-0.511** [-0.860,-0.162]	-3.086*** [-3.361,-2.811]	-2.427*** [-2.731,-2.122]
Social adaption			0.214*** [0.189,0.239]	0.199*** [0.175,0.223]	-0.147*** [-0.167,-0.127]	-0.134*** [-0.154,-0.115]
Attitude towards aging					-0.107*** [-0.127,-0.086]	-0.081*** [-0.102,-0.060]
Age		0.028*** [0.014,0.043]		-0.043*** [-0.057,-0.030]		0.016** [0.004,0.029]
Gender Male		0.044 [-0.118,0.205]		0.021 [-0.129,0.172]		-0.148* [-0.283,-0.013]
Reside Urban		-0.183 [-0.368,0.002]		0.050 [-0.116,0.217]		-0.314*** [-0.469,-0.159]
Education Primary school education or below		0.131 [-0.094,0.355]		-0.303** [-0.511,-0.094]		-0.065 [0.255,0.124]
Junior high school		0.202 [-0.068,0.473]		-0.307* [-0.562,-0.053]		-0.082 [0.312,0.148]
Secondary technical school education or above		0.887*** [0.559,1.215]		0.019 [-0.288,0.326]		-0.141 [0.419,0.137]
Marital status						

Widowed	-0.100 [- 0.416,0.217]	-0.079 [- 0.379,0.222]	-0.043 [- 0.286,0.201]
Divorced or never- married	0.399 [- 0.357,1.155]	-0.011 [- 0.742,0.720]	-0.031 [- 0.665,0.604]
Household income	0.191*** [0.116,0.265]	0.010 [- 0.059,0.080]	-0.194*** [-0.254,- 0.133]
The number of people living together			
=1	0.475* [0.081,0.869]	-0.080 [- 0.468,0.307]	-0.712*** [-1.024,- 0.401]
2	0.449* [0.087,0.812]	-0.344 [- 0.695,0.006]	-0.035 [- 0.319,0.248]
Chronic disease			
	-0.274** [-0.459,- 0.088]	-0.922*** [-1.085,- 0.759]	0.515*** [0.357,0.673]
ADL score	-0.579*** [-0.694,- 0.464]	-0.380*** [-0.487,- 0.274]	0.382*** [0.305,0.460]
Intercept	23.333*** [23.218,23.4 49]	19.522*** [18.278,20.7 66]	14.873*** [14.277,15.4 70]
		19.464*** [18.205,20.7 24]	21.979*** [21.394,22.5 64]
			21.708*** [20.519,22.8 96]
<i>N</i>	8453	8453	8453
<i>F</i>	336.490	77.428	76.827
<i>R</i> ²	0.105	0.126	0.055
		0.090	0.142
			0.175

Note: 95% confidence intervals in brackets, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table4 The indirect effect of different internet usage capabilities on depressive symptoms

Path	Effect s	SE	Z	95% CI	
All sample					
Basic-level use→Social Adaption→Attitudes towards aging→Depressive symptoms	-0.015***	0.003	-5.08	-0.021	-0.009
Practical use→Social Adaption→Attitudes towards aging→Depressive symptoms	-0.038***	0.006	-6.54	-0.049	-0.026
Advanced-level use→Social Adaption→Attitudes towards aging→Depressive symptoms	-0.063***	0.009	-6.68	-0.082	-0.045
Basic-level use→Social Adaption→Depressive symptoms	-0.123***	0.018	-6.69	-0.159	-0.087
Practical use→Social Adaption→Depressive symptoms	-0.307***	0.027	-11.14	-0.362	-0.254
Advanced-level use→Social Adaption→Depressive symptoms	-0.517***	0.043	-11.98	-0.601	-0.087
Urban					
Basic-level use→Social Adaption→Attitudes towards aging→Depressive symptoms	-0.016***	0.004	-3.57	-0.025	-0.007
Practical use→Social Adaption→Attitudes towards aging→Depressive symptoms	-0.031***	0.008	-4.02	-0.046	-0.016
Advanced-level use→Social Adaption→Attitudes towards aging→Depressive symptoms	-0.048***	0.012	-4.05	-0.071	-0.025
Basic-level use→Social Adaption→Depressive symptoms	-0.207***	0.035	-5.91	-0.276	-0.139
Practical use→Social Adaption→Depressive symptoms	-0.404***	0.040	-10.02	-0.483	-0.325
Advanced-level use→Social Adaption→Depressive symptoms	-0.631***	0.058	-10.87	-0.745	-0.517
Rural					
Basic-level use→Social Adaption→Attitudes towards aging→Depressive symptoms	-0.012**	0.003	-3.15	-0.019	-0.005
Practical use→Social Adaption→Attitudes towards aging→Depressive symptoms	-0.044***	0.009	-4.77	-0.063	-0.026
Advanced-level use→Social Adaption→Attitudes towards aging→Depressive symptoms	-0.087***	0.019	-4.74	-0.124	-0.052
Basic-level use→Social Adaption→Depressive symptoms	-0.235***	0.018	-3.45	-0.099	-0.027
Practical use→Social Adaption→Depressive symptoms	-0.517***	0.043	-5.50	-0.319	-0.151
Advanced-level use→Social Adaption→Depressive symptoms	-0.745***	0.080	-5.86	-0.621	-0.310

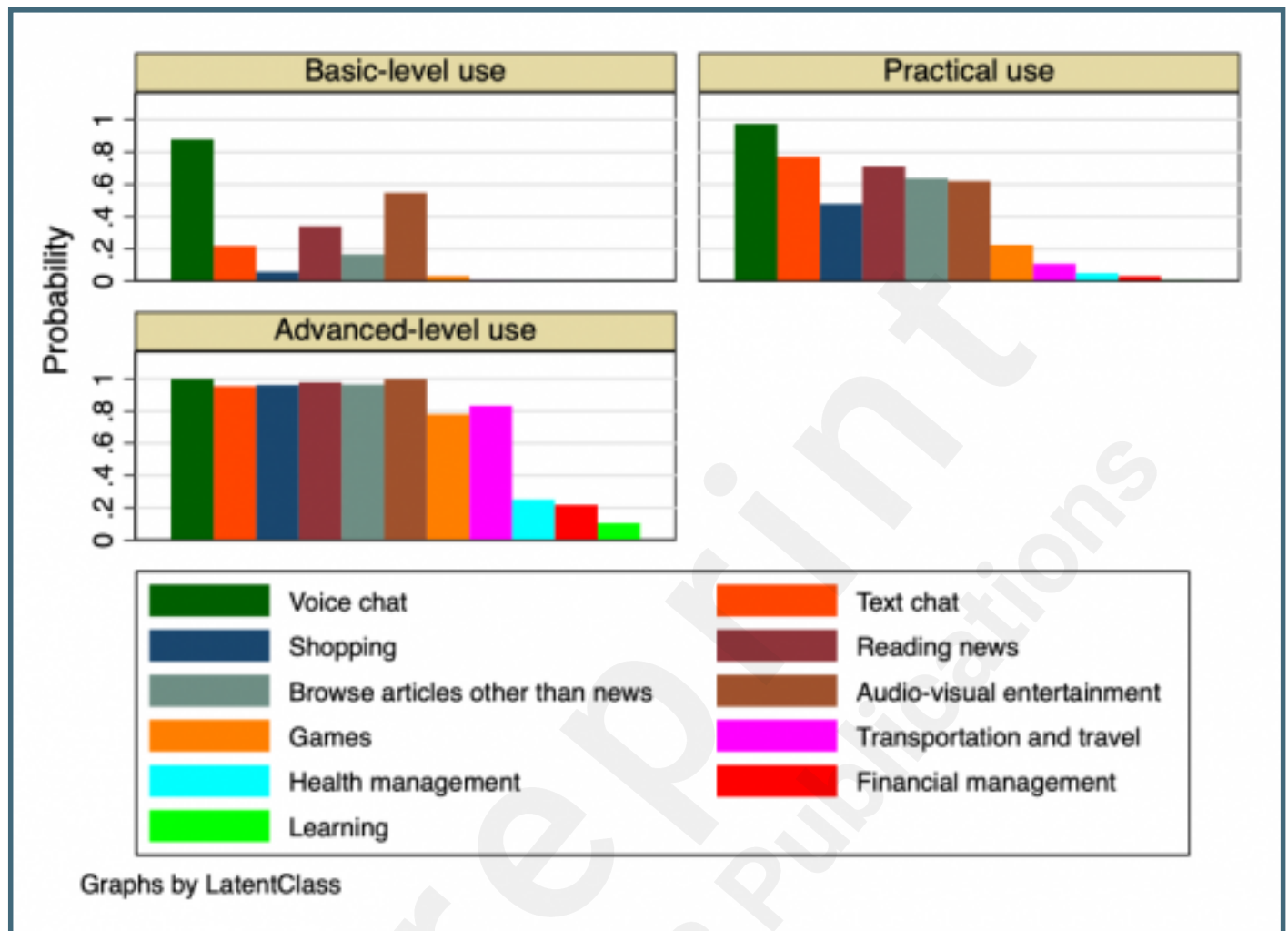
symptoms	0.466 ^{***}				
Advanced-level use→Attitudes towards	-	0.017	-3.80	0.031	0.097
aging→Depressive symptoms	0.064 ^{***}				

Note: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

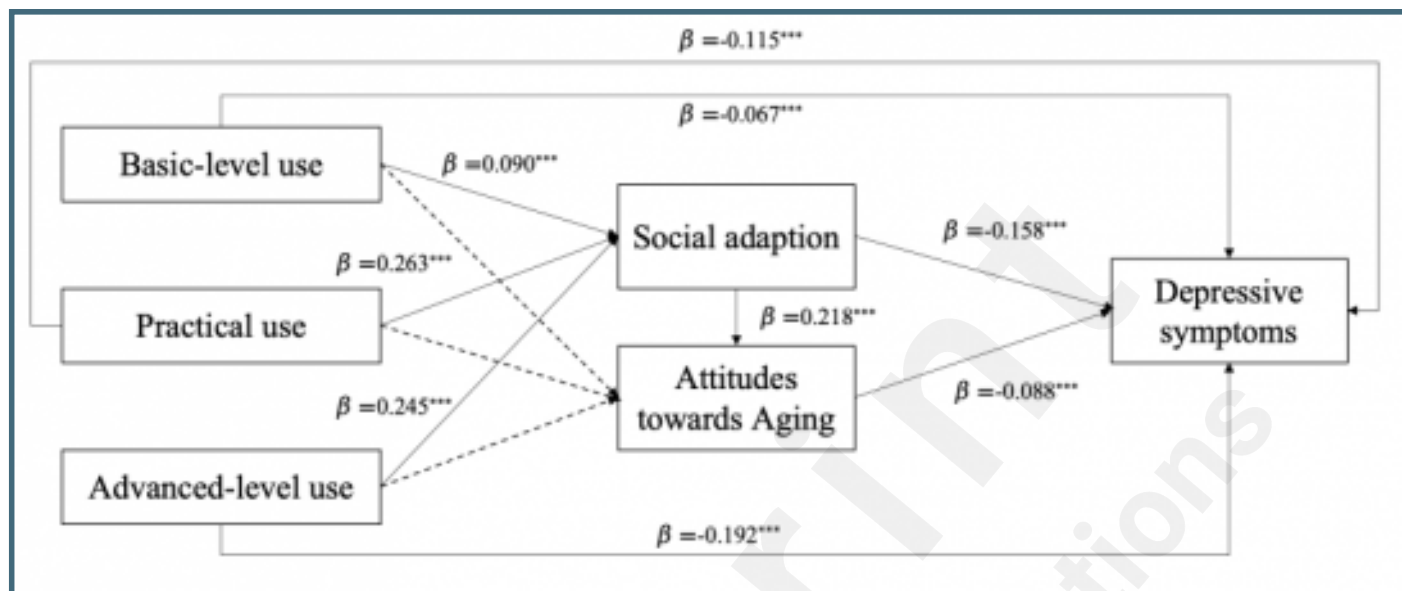
Supplementary Files

Figures

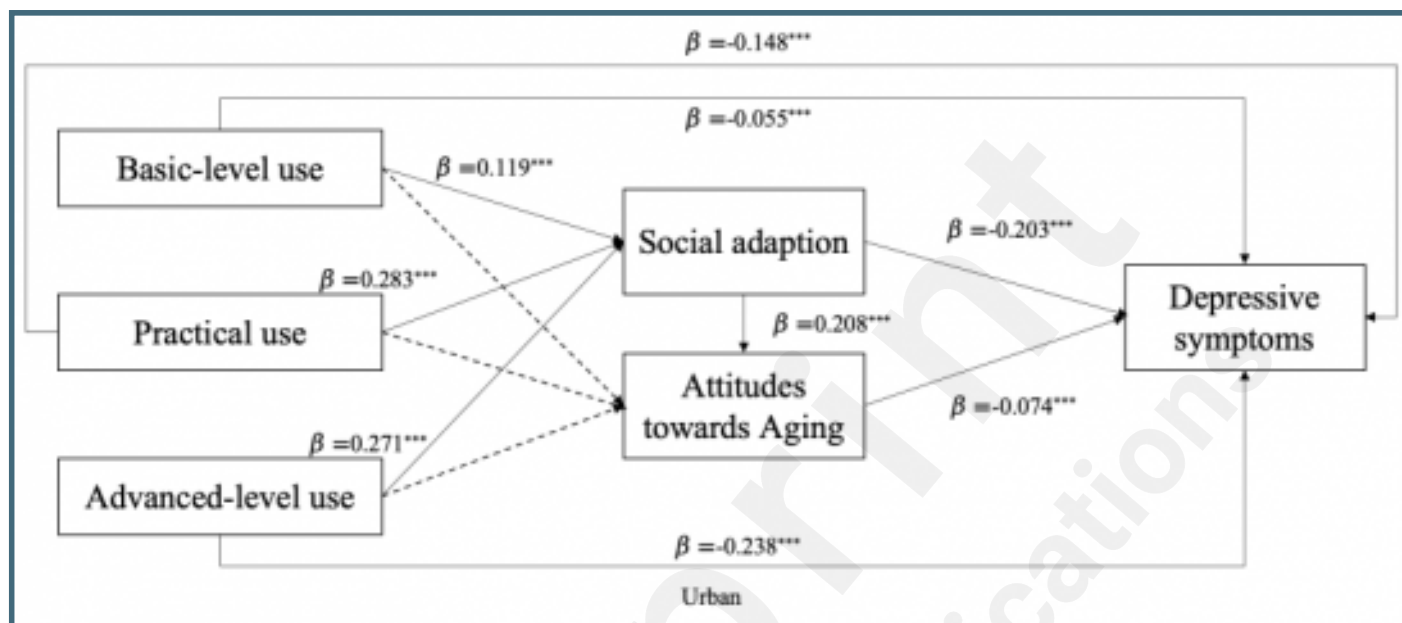
The conditional response probabilities of each factor in the latent class analysis.



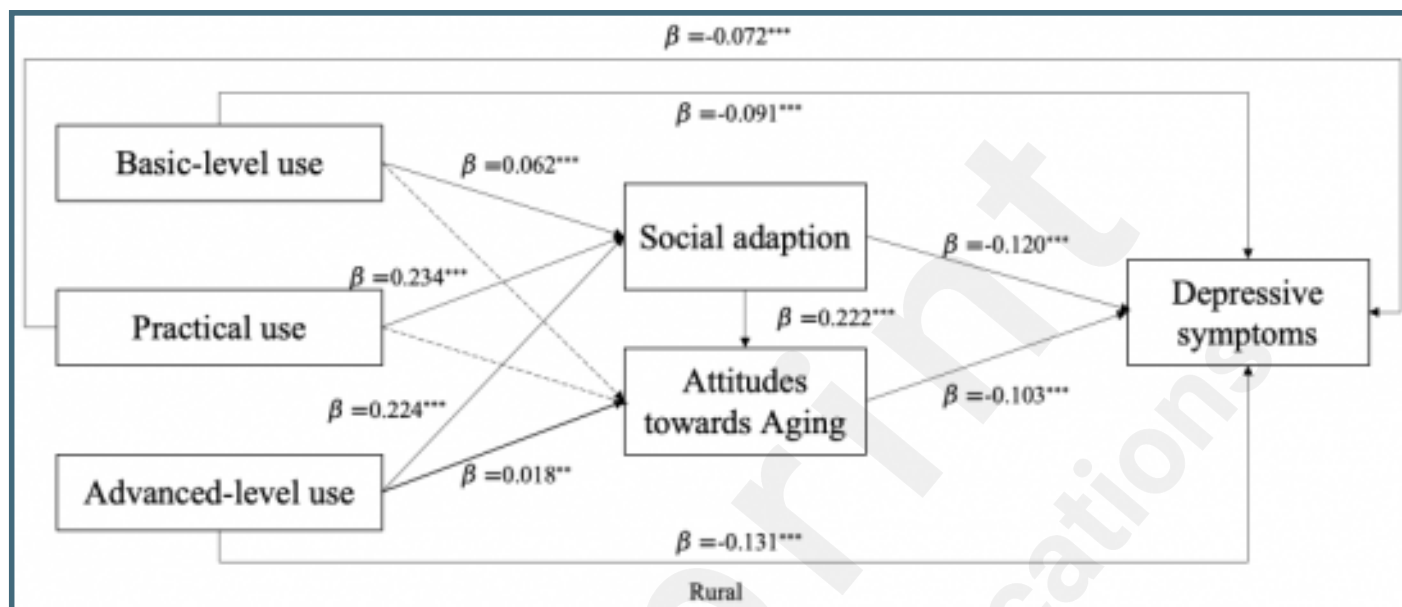
The chain mediating path between the Internet use ability and depressive symptoms, with social adaptation and attitude towards aging serving as mediators. Note?RMSEA=0.019, CFI=0.994, TLI=0.971, SRMR=0.006. The solid line indicates significance at the 5% level, and the dashed line indicates non-significance. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.



Urban-rural differences in the chain mediation between Internet use ability and depressive symptoms, with social adaptation and attitude towards aging serving as mediators. Note: Model fitting indices for the urban sample: RMSEA=0.037, CFI=0.984, TLI=0.905, SRMR=0.009; Model fitting indices for the rural sample: RMSEA=0.015, CFI=0.997, TLI=0.980, SRMR=0.006. The solid line indicates significance at the 5% level, and the dashed line indicates non-significance. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.



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Multimedia Appendixes

The supplementary materials provide a table of the stepwise regression results by urban and rural areas, as well as a detailed table of the structural equation model results by urban and rural areas.

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