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A Study on the Influencing Mechanisms of Older Adults' Intention to Participate in Online Continuing Education under Urban Differences

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Abstract
To uncover the underlying logic behind older adults' Intention to participate in online continuing education and the contextual role of urban differences, this study constructs an analytical framework based on expectancy-value theory. A total of 355 valid questionnaires were collected to empirically examine the influence of digital proficiency, course relevance, and perceived social support on older adults' Intention to engage in online education. Furthermore, city tier was introduced as a moderating variable to analyze multi-path moderation effects. The results show that all three explanatory variables are positively associated with the Intention to participate in online education, with the effects of digital proficiency and course relevance being stronger in higher-tier cities. These findings not only enrich the theoretical perspectives on older adults' online learning behavior but also reveal the moderating logic of regional environments in educational behavior mechanisms, providing empirical evidence and managerial implications for improving the adaptability and regional balance of elderly education resources.

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Keywords: Digital Proficiency; Course Relevance; Level of Perceived Social Support; Intention to Participate in Online Education; City Tier

1. Introduction

By the end of 2024, the population aged 60 and above in China had exceeded 310 million, accounting for 22% of the total population, among which 220 million were aged 65 and above, representing 15.6% of the total [1]. As the proportion of the elderly continues to increase, the aging trend is becoming increasingly severe, posing substantial challenges to economic and social development and profoundly transforming the structure of educational demand. Promoting elderly education, especially online continuing education, has become an important measure in actively addressing population aging and enhancing the quality of life and social participation of older adults. However, due to imbalances in regional economic development and significant disparities in digital infrastructure, elderly groups in different cities face considerable differences in access to digital technology, educational resources, and opportunities for continuing education. These urban differences may serve as critical contextual factors influencing older adults' Intention to engage in online education. Therefore, exploring whether and how urban disparities affect older adults' Intention to participate in online continuing education not only helps to accurately identify the limiting factors but also provides theoretical support and practical guidance for promoting balanced development and educational equity in elderly education.

The growing diversity and individualization of learning needs among the elderly, along with the national push to meet these needs to promote "active aging" and "lifelong learning," have become major topics in the current reform of China's social governance and education system.

[1] Data source: http://www.ce.cn/xwzx/gnsz/gdxw/202501/17/t20250117_39269947.shtml

Compared with traditional offline elderly education, online continuing education has gradually become an important channel for older adults to acquire knowledge and improve their abilities, owing to its flexibility and abundant resources. However, due to constraints such as the digital divide, insufficient relevance of learning content, and limited social support systems, older adults exhibit significant differences in their Intention to participate in online continuing education. This calls for an in-depth investigation into the motivational drivers and influencing mechanisms behind such behavior. Existing studies have primarily focused on the adoption of online education among young or working populations, with relatively limited research on older adults—especially studies that provide systematic, data-driven analysis of the factors influencing their Intention to participate. Furthermore, with the gradual penetration of digital educational resources into lower-tier areas, disparities in resource allocation, information accessibility, and learning environments across cities may lead to differentiated learning decisions among older adults. Considering the significant stratification among cities in terms of infrastructure, social support systems, and public service provision, it is necessary to introduce "city tier" as a moderating variable to explore how it influences older adults' engagement in online education.

Against this backdrop, this study is based on questionnaire survey data and systematically analyzes the influence paths of three key factors—digital proficiency, course relevance, and perceived social support—on older adults' Intention to participate in online continuing education. It further examines the moderating role of city tier in these influence paths. The research aims to answer the following questions:

(1) Among digital proficiency, course relevance, and social support, which factors significantly affect older adults' Intention to engage in online education?

(2) Do differences in city tier alter the strength or direction of these influence paths?

(3) How can digital education pathways and support mechanisms be optimized to better accommodate the needs of the elderly?

By addressing these questions, this study aims to enrich the theoretical understanding of elderly education and online learning motivation, and to provide empirical evidence for enhancing the age-friendliness of educational resources and promoting the digital inclusion of older adults.

2. Theoretical Analysis and Research Hypotheses

2.1 Digital Proficiency and Intention to Participate in Online Education

In the 1950s, American psychologist Atkinson proposed the expectancy-value theory, which was later systematically developed by scholars such as Eccles and Wigfield in the 1980s. This theory posits that an individual's decision to engage in a particular activity is based on two key considerations: expectancy and value. Expectancy refers to the individual's belief in their ability to successfully complete a given task. In the context of online continuing education, digital proficiency constitutes a fundamental prerequisite for older adults to participate effectively. In today's information society, digital literacy is not only a skill but also a form of "entry threshold" that directly determines whether older adults can efficiently use smart devices and operate online platforms. Consequently, it affects their acceptance of and Intention to engage in online education—that is, their perceived ability to meet the expectancy component of the theory.

For older adults, the higher their level of digital proficiency, the fewer technological barriers they encounter when using online learning platforms. This facilitates a stronger perception of usability and ease of use, thereby enhancing their overall Intention to participate (Chen & and Chan, 2014; Venkatesh et al., 2003) [1, 2]. This mechanism is particularly pronounced in elderly populations. On one hand, older adults with strong digital skills can complete necessary steps such as device login, platform navigation, account registration, and course searching with ease, thus reducing the cost of participation. On the other hand, the sense of self-efficacy and achievement derived from mastering technology further motivates continued engagement with online platforms(Cao et al., 2025) [4].

Existing studies have also found that older adults with higher digital proficiency are more likely to use digital services such as WeChat, online medical consultations, and online financial management [1], further confirming the applicability of the "ability–Intention" pathway in digital environments. With increasing efforts by software developers to simplify user interfaces, more elderly individuals are beginning to explore digital tools like short videos, social media, and online healthcare, which objectively facilitates their engagement in online learning (Tian Xueyuan et al., 2021). Therefore, the higher the level of digital proficiency among older adults, the more likely they are to enhance their ability to access information and build confidence in using educational platforms, thereby increasing their Intention to participate in online education.

Based on the above, the following hypothesis is proposed:

H1: The higher the level of digital proficiency among older adults, the stronger their Intention to participate in online continuing education.

2.2. Course Relevance and Intention to Participate in Online Education

According to expectancy-value theory, the second key factor influencing an individual's learning decision is value, that is, whether the learning activity is perceived as meaningful or beneficial. For older adults, the extent to which continuing education courses align with their life experiences, personal interests, or practical needs is a crucial determinant of whether they perceive the courses as "useful" and "worth the effort." Course content that is disconnected from their lived realities—being overly theoretical or abstract—may fail to establish a sense of value relevance, thereby weakening learning motivation and generating psychological distance, which in turn lowers the Intention to engage in learning.

Previous studies have shown that when older adults choose online learning platforms, course practicality and life relevance are among the most important considerations (Jianrong Shi, 2024). The stronger the course relevance, the more likely it is to enhance older adults' recognition of the platform and their intention to continue using it (Chen & and Chan, 2014) [1]. Therefore, whether the course content is closely aligned with older adults' experiences and interests becomes a key factor in determining whether the learning is deemed "worthwhile."

Based on this, the following research hypothesis is proposed:

H2: The higher the perceived course relevance among older

adults, the stronger their Intention to participate in online continuing education.

2.3 Social Support and Intention to Participate in Online Education

Social support refers to the psychological, emotional, and instrumental assistance that individuals receive within their social networks (Cobb, 1976). It not only helps alleviate stress and enhance psychological security but also significantly influences individuals' behavioral decisions and sustained engagement. For older adults, accepting new activities—such as online learning—is often accompanied by anxiety and uncertainty. In this context, encouragement and companionship from family members, friends, or community organizations may serve as crucial external support factors during the decision-making process.

In learning-related settings, social support goes beyond emotional comfort; it also includes practical assistance such as helping to download apps or explaining how to navigate platforms. This type of support can substantially lower both the psychological threshold and technical barriers for older adults engaging in online education for the first time. More importantly, positive reinforcement from family or peer groups can create a "social recognition" effect, strengthening older adults' confidence in their abilities and choices, and thereby transforming into stronger participation Intention (Qian Liu, 2022). Li Yanlin and others have also noted that older adults with higher levels of social support are more willing to access online services such as telemedicine, social networking, and learning platforms—largely due to the psychological mechanisms of "security" and "belonging" that such support fosters (Li & Yan, 2025) [5].

Therefore, social support plays a dual role in older adults' online learning behavior: it serves as both an external driver and an internal reinforcer—reducing the barriers to engagement while simultaneously stimulating motivation through social recognition. Based on this, the following hypothesis is proposed:

H3: The higher the perceived level of social support among older adults, the stronger their Intention to participate in online continuing education.

2.4. The Moderating Effect of City Tier

Individual behavioral responses are shaped not only by internal characteristics but also by external environmental conditions. In complex social systems, environmental variables often moderate the strength or direction of existing causal relationships (Donaldson, 2001). City tier refers to the relative position of a city within the national economic development system, commonly assessed based on population size, total economic output, resource allocation capacity, consumption potential, and regional influence. Drawing on the widely used five-level city classification system from the National Bureau of Statistics and related research, this study categorizes cities as follows: Tier 1 cities (coded as 1), New Tier 1 (coded as 2), Tier 2 (coded as 3), Tier 3 (coded as 4), and Tier 4 or below (coded as 5). A lower numerical value indicates a higher level of urban development and a stronger degree of resource concentration. In lower-coded cities such as Tier 1 and New Tier 1, digital infrastructure has typically been developed earlier and more rapidly. Older adults in these cities are more frequently exposed to smart devices and online services in their daily lives. This long-term exposure forms the basis for higher levels of operational competence and user confidence. Moreover, many high-tier cities have already established relatively comprehensive digital literacy training systems for older adults at the community level. These include public courses, volunteer services, and age-friendly technology guidance, offering institutionalized support to help the elderly overcome usage barriers. Such supportive environments not only enhance older adults' digital proficiency but also improve their practical abilities to apply technology. In addition, high-tier cities are characterized by denser information dissemination, more dynamic social interactions, and greater usage of technology among family members, friends, and neighbors. This broader social influence and more positive learning atmosphere foster "pushed" behavioral motivations among the elderly, making it easier to translate their technical ability into a Intention to participate in online learning.

Based on this, the following hypothesis is proposed:

H4a: City tier negatively moderates the relationship between digital proficiency and Intention to participate in online education, such that the positive effect of digital proficiency is stronger in lower-tier-value (higher-tier) cities

In cities of different tiers, the perception of course relevance and its influence mechanism may vary significantly. Older adults in higher-tier cities typically have higher educational attainment and stronger information acquisition capabilities. They are often immersed in environments with abundant learning resources and place greater emphasis on the practical application and personal relevance of learning content. For this group, course relevance is not only a starting point for learning interest but also a key criterion for evaluating platform quality and the necessity of participation. Therefore, in high-tier cities, higher course relevance has a more pronounced positive effect on Intention to learn. In contrast, older adults in lower-tier cities may have limited access to educational resources and fewer opportunities to engage with course information. Their learning intentions may be more influenced by external incentives or situational cues rather than the appeal of the course content itself. As such, the positive relationship between course relevance and Intention to learn may be relatively weaker in lower-tier cities.

Accordingly, the following hypothesis is proposed:

H4b: City tier negatively moderates the relationship between perceived course relevance and Intention to participate in online education, such that the positive relationship is stronger in lower-tier-value (higher-tier) cities

As a key external factor influencing behavioral intentions among older adults, social support may also function differently across cities of varying tiers. In higher-tier-value (i.e., lower-tier) cities, older adults are more likely to co-reside with their children, maintain closer neighborly ties, and engage in face-to-face community interactions. These stable and intimate social networks make it easier for social support to translate into behavioral drivers. Encouragement from family, recommendations from neighbors, and guidance from acquaintances often play a critical role in decision-making, significantly enhancing older adults' confidence and motivation to engage in online learning. In contrast, although lower-tier-value (i.e., higher-tier) cities may offer more diverse sources of social support—including community volunteers, interest-based organizations, and online groups—

such networks tend to be looser and characterized by weaker ties, thus exerting relatively limited direct influence on individual behavior. Furthermore, older adults in these cities often have wider access to information and stronger decision-making autonomy, making their learning behavior more self-driven, based on personal cognition and interest. The marginal impact of social support in such contexts is therefore reduced.

Based on this, the following hypothesis is proposed:
H4c: City tier negatively moderates the relationship between perceived social support and Intention to participate in online education, such that the positive relationship is stronger in lower-tier-value (higher-tier) cities.

2.5. Overall Theoretical Model

The primary objective of this study is to investigate older adults' Intention to participate in online education. Specifically, it examines the relationships between digital proficiency, course relevance, and perceived social support, and their impact on older adults' Intention to engage in online learning. In addition, the moderating effect of city tier on these relationships is explored. The overall theoretical model is illustrated in Figure 1.

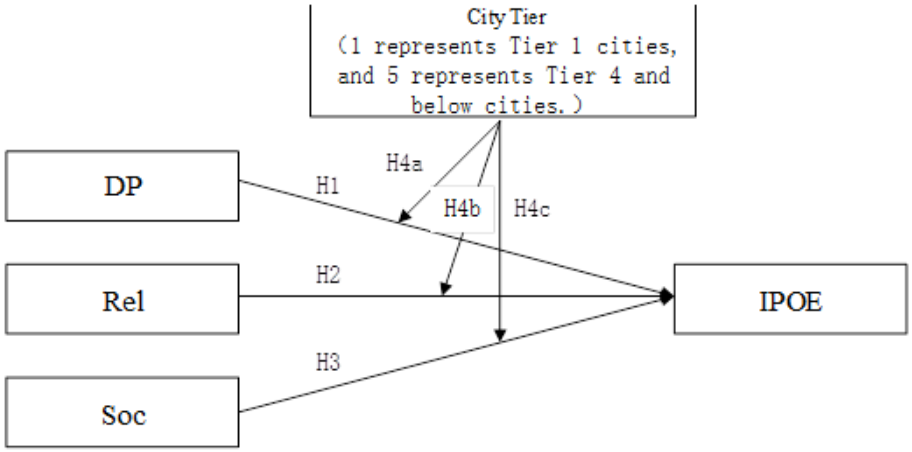

Fig 1: Theoretical Model

3. Research Methodology

3.1. Sample and Data Collection

This study employed a questionnaire survey to collect data. The target respondents were individuals aged 60 and above with basic reading and comprehension abilities. The sample covered both urban and rural regions and demonstrated a reasonable level of representativeness. Data collection was conducted through a combination of online and offline channels to enhance the completeness and reliability of the data. The online survey was distributed via WeChat groups and community platforms commonly used by older adults, while the offline survey was administered on-site in elderly activity centers, universities for seniors, and public cultural squares, with assistance provided during the response process.

A total of 430 questionnaires were collected, of which 355 were deemed valid after removing incomplete or invalid responses, yielding a valid response rate of 82.7%, which meets the requirements for empirical analysis (Yehuda, 1999) [3].

3.2. Sample Description

The sample primarily covered regions including Guangdong, Guangxi, Northeast China, and North China. Of the respondents, 58% were female and 42% male, with 65.35% holding an education level of associate degree or above. Nearly all respondents reported using smartphones "occasionally" or "frequently" for information access and entertainment, indicating a basic familiarity with online activities.

Table 1 presents the descriptive statistics for the four dimensions measured in this study: perceived digital proficiency, perceived course relevance, perceived social support for participation in online education, and Intention to participate in online education. All variables were measured using a 5-point Likert scale, ranging from 1 ("strongly disagree") to 5 ("strongly agree").

For digital proficiency, scores ranged from 3.594 to 3.662, indicating that mostolder respondents possessed basic operational skills in using digital devices. The score range for course relevance was between 2.349 and 3.642; notably, the lowest-scoring item was "I can understand the expressions and terms used in the course," reflecting a need for improvements in the linguistic accessibility of current online courses to better align with the cognitive characteristics and comprehension abilities of older adults.

Scores for perceived social support ranged from 3.625 to 3.668, suggesting that both family and society generally maintain a supportive and encouraging attitude toward older adults' engagement in online continuing education. Regarding the Intention to participate in online education, scores ranged from 3.628 to 3.665, indicating that the majority of respondents held a positive and optimistic attitude toward engaging in online learning.

Table 1: Descriptive Statistics of the Sample

Variable		N	Min	Max	Mean	SD
Digital Proficiency (DP)	A1	355	1	5	3.594	0.882
	A2	355	1	5	3.662	0.932
	A3	355	1	5	3.659	0.962
	A4	355	1	5	3.651	0.890
	A5	355	1	5	3.614	0.977
Course Relevance (Rel)	A6	355	1	5	3.603	0.967
	A7	355	1	5	3.603	0.964
	A8	355	1	5	3.654	1.001
	A9	355	1	5	2.349	0.894
	A10	355	1	5	3.642	0.962
Level of Perceived Social Support (Soc)	A11	355	1	5	3.676	0.892
	A12	355	1	5	3.625	0.970
	A13	355	1	5	3.662	0.999
	A14	355	1	5	3.625	0.964
	A15	355	1	5	3.668	0.928
Intention to Participate in Online Education (IPOE)	B11	355	1	5	3.628	0.922
	B12	355	1	5	3.665	0.946
	B13	355	1	5	3.642	1.002
	B14	355	1	5	3.651	0.915
	B15	355	1	5	3.637	0.902

3.3. Reliability and Validity Tests and Confirmatory Factor Analysis

To verify the reliability of the questionnaire, this study conducted tests on Cronbach's α coefficients, convergent validity, and construct reliability for all measurement constructs. As shown in Table 2, the Cronbach's α values for all variables exceeded 0.8, and the Composite Reliability (CR) values were also above 0.8, indicating that the scales possess high reliability and internal consistency.

Meanwhile, the Average Variance Extracted (AVE) values for all latent variables were greater than 0.5, suggesting that the observed indicators effectively reflect their corresponding constructs. In addition, the results of the Kaiser-Meyer-Olkin (KMO) test showed that all variables had KMO values above 0.8, indicating good structural validity and confirming that the data are suitable for further factor analysis.

Table 2: Reliability and Validity Indicators

	Cronbach's α	KMO	AVE	CR
IPOE	0.810	0.843	0.568	0.868
DP	0.805	0.842	0.563	0.865
Rel	0.839	0.861	0.611	0.887
Soc	0.849	0.861	0.624	0.892

Given that the data were obtained through a questionnaire survey, this study tested for potential common method bias (CMB). The Harman's single-factor test was employed, and the results indicated that the first unrotated principal component accounted for 34.76% of the total variance, which is below the 40% threshold proposed by Hair et al. This suggests that the study is not significantly affected by common method bias.

To ensure the robustness of hypothesis testing and the stability of the model, confirmatory factor analysis (CFA) was further conducted to evaluate model fit. The results were as follows: Chi-square = 218.222, degrees of freedom (df) = 164, Chi-square/df = 1.33 (less than 3), Comparative Fit Index (CFI) = 0.908 (greater than 0.9), Tucker-Lewis Index (TLI) = 0.977 (greater than 0.9), Standardized Root Mean Square Residual (SRMR) = 0.041, and Root Mean Square Error of Approximation (RMSEA) = 0.031 (less than 0.08) [7]. All fit indices met the recommended standards, indicating that the model demonstrates a good fit to the data.

In addition, according to established theoretical standards, discriminant validity is considered acceptable when the Average Variance Extracted (AVE) of each latent variable exceeds 0.5 and shared variance is not considered. In this study, the AVE values for all constructs were greater than 0.5, further confirming the model's satisfactory level of discriminant validity.

4. Results

4.1. Correlation Analysis

Table 3 presents the correlation results among the key variables. The analysis reveals that digital proficiency, course relevance, perceived social support, and city tier are all significantly and positively correlated with the Intention to participate in online education ($p < 0.01$). In contrast, demographic variables such as age, gender, education level, and income do not show statistically significant correlations with educational Intention ($p > 0.1$).

Additionally, variance inflation factor (VIF) tests indicate that all variables have VIF values below 3, suggesting that multicollinearity is not a serious concern in the dataset.

Table 3: Correlation Coefficients and VIF Values

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(1) Age	1.000							
(2) Gender	-0.020	1.000						
(3) Edu	0.024	0.028	1.000					
(4) income	0.029	0.015	-0.046	1.000				
(5) CityTier	-0.008	-0.001	-0.007	0.000	1.000			
(6) DP	-0.029	-0.070	-0.049	-0.029	-0.129**	1.000		
(7) Rel	-0.008	0.007	-0.025	-0.017	-0.181***	0.506***	1.000	
(8) Soc	0.043	-0.077	-0.049	-0.080	-0.237***	0.478***	0.499***	1.000
(9) IPOE	0.065	-0.067	-0.015	-0.060	-0.224***	0.434***	0.371***	0.394***
VIF	1.01	1.01	1.00	1.01	1.07	1.49	1.53	1.54

Notes: N = 355; ***p < 0.01, **p < 0.05, *p < 0.1

4.2. Hypothesis Testing

Based on the results of the correlation analysis, regression tests were conducted to verify the proposed hypotheses. The results are presented in Table 4 and Table 5. Specifically, Models 1 through 3 examine the direct effects of digital proficiency, course relevance, and perceived social support on older adults' Intention to participate in online education. The results show that the coefficients of all independent variables are significantly positive at the 1% level ($\beta_1 = 0.441$, $p < 0.01$; $\beta_2 = 0.351$, $p < 0.01$; $\beta_3 = 0.371$, $p < 0.01$), indicating that higher levels of digital proficiency, course relevance, and perceived social support are all associated with stronger Intention to engage in online education among older adults. Therefore, Hypotheses H1 through H3 are supported.

Table 4: Regression Results

	Model 1	Model 2	Model 3
	IPOE		
DP	0.441***	-	-
	(0.066)		
Rel	-	0.351***	-
		(0.061)	
Soc	-		0.371***
			(0.060)
Constant	2.042***	2.460***	2.291***
	(0.255)	(0.219)	(0.233)
Number	355	355	355
R^2	0.188	0.138	0.155

Notes: ***p<0.01, **p<0.05, *p<0.1

Models 4 through 6 in Table 5 examine the moderating effects. The results show that only the interaction term in Model 5 is statistically significant at the 10% level ($\beta = -0.083$, $p < 0.1$), indicating that as the city tier value decreases (i.e., from lower-tier to higher-tier cities), the positive effect of course relevance on the Intention to participate in online education becomes stronger. Thus, Hypothesis H5 is supported.

In contrast, the interaction terms in Models 4 and 6 are not statistically significant, suggesting that the effects of digital proficiency and perceived social support on online education Intention do not differ significantly across city tiers. Therefore, Hypotheses H4 and H6 are not supported.

One possible explanation is that in recent years, the widespread diffusion of smart devices and internet technology across the country has narrowed the gap in basic digital skills acquisition between cities. Additionally, social support primarily stems from family, friends, or community networks, which are relatively common across cities and less influenced by city tier. As a result, the effect of social support on educational Intention is less likely to be moderated by city tier.

Table 5: Results of Moderating Effect Tests

	Model 4	Model 5	Model 6
	IPOE		
DP	0.454***	-	-
	(0.162)		
Rel	-	0.599***	-
		(0.157)	
Soc	-	-	0.325
			(0.169)
City Tier	-0.439	0.186	-0.096
	(0.193)	(0.165)	(0.194)
DP* City Tier	-0.015	-	-
	(0.051)		
Rel* City Tier	-	-0.083*	-
		(0.047)	
Soc* City Tier	-		0.004
			(0.051)
Constant	2.227***	1.871***	2.680***
	(0.625)	(0.562)	(0.663)
Number	355	355	355
R^2	0.218	0.174	0.173

Notes: ***p<0.01, **p<0.05, *p<0.1

To further examine the moderating effect of city tier, this study conducted a group-based test by dividing the sample into high-value city group (lower-tier cities) and low-value city group (higher-tier cities) based on the average city tier score of 2.79 as the cutoff point. The moderation effect is illustrated in Figure 2.

The regression results show that in the relationship between course relevance and online education Intention, the regression coefficient for the high-tier group is 0.35 ($p < 0.01$), while that for the low-tier group is 0.28 ($p < 0.01$). The CHOW test results confirm that the difference in coefficients between the two groups is statistically significant, providing further support for Hypothesis H5.

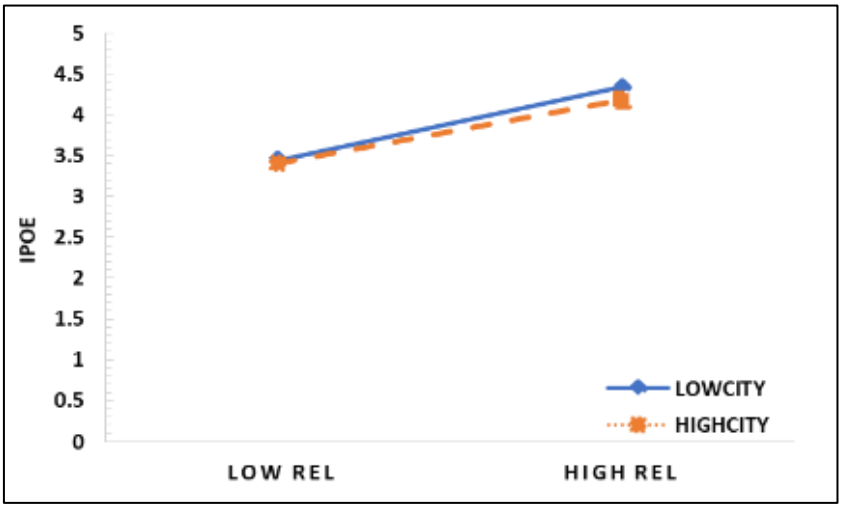

Fig 2: The Moderating Effect of City Tier on the Relationship between Course Relevance (Rel) and Intention to Participate in Online Education (IPOE)

5. Conclusions and Implications

5.1. Research Conclusions

With the accelerating pace of population aging, promoting and popularizing online continuing education for older adults has become a key direction in advancing the lifelong learning system. Based on questionnaire survey data, this study systematically explores the mechanisms through which digital proficiency, course relevance, and perceived social support influence older adults' Intention to participate in online education. City tier is introduced as a moderating variable to analyze the heterogeneity in the role of urban development level in this process.

The empirical results confirm Hypotheses H1, H2, and H3: digital proficiency, course relevance, and social support each have a significantly positive impact on older adults' Intention to engage in online continuing education. Furthermore, city tier exhibits a significant negative moderating effect on the relationship between course relevance and educational Intention. Specifically, in cities with lower tier values (e.g., Tier 1 cities), the positive effect of course relevance on Intention is stronger. This reflects the amplifying influence of open information environments, richer educational resources, and stronger learning atmospheres, which enhance individuals' perceived value of course content and ultimately reinforce their behavioral Intention to learn.

5.2. Theoretical Contributions

First, this study verifies the decisive role of digital proficiency in older adults' online learning behavior, enriching the application of expectancy-value theory in the context of elderly education. While traditional expectancy-value models have been widely used to explain learning motivation among adolescents and working adults, this study incorporates "technological competence" as a precursor to value perception. It demonstrates that digital proficiency not only influences perceptions of task attainability but also serves as a practical foundation for older adults' value judgments in learning. This perspective expands the structural dimension of learning motivation theory.

Second, this research highlights the positive effect of course relevance on older adults' learning Intention, reinforcing the centrality of "subjective task value" within the expectancy-value framework. The empirical evidence shows that the alignment between course content and older adults' life experiences and interests plays a critical role in motivating learning, suggesting that future research on learning motivation should further examine the coupling mechanisms between content design and individual cognitive structures.

Third, the study confirms the constructive role of social support in older adults' online learning, thereby extending the explanatory power of social support theory within educational behavior contexts. While prior studies have primarily focused on health behaviors and psychological adjustment, this research reveals that both emotional and instrumental support can lower entry barriers to learning and enhance older adults' sense of belonging and willingness to remain engaged.

Lastly, the identified moderating effect of city tier demonstrates that contextual variables can systematically influence the strength of learning motivations among older adults, thus validating a core proposition of situational theory concerning the "regulatory function of external environments." Variations in educational resource density, information accessibility, and social atmosphere across different city tiers play differentiated roles in shaping the relationship between motivational factors and behavioral Intention. This finding suggests that future behavioral research should incorporate individual–environment coupling mechanisms to promote theoretical integration between structure and agency.

5.3. Managerial Implications

This study analyzes the Intention of older adults to participate in online continuing education and its influencing mechanisms. Based on the empirical findings, the following practical and targeted managerial implications are proposed:

First, enhance digital empowerment to boost older adults' confidence in using technology. The findings indicate that digital proficiency is a crucial prerequisite for older adults to engage in online education. In practice, diversified approaches should be adopted to provide digital skills training for the elderly and help them overcome the "first barrier" to participation. Community management departments can collaborate with universities and platform enterprises to regularly organize public activities such as "smart device usage tutorials" and "hands-on online course experiences." Promoting age-friendly user guides and increasing older adults' competence and confidence in using

digital tools can effectively transform technological capability into educational Intention.

Second, optimize course design to strengthen the alignment between content and older adults' everyday life contexts. Since course relevance exerts a significantly positive influence on learning Intention, course development should avoid excessive youth-orientation or abstract theoretical content. Instead, it should focus on practical topics that are of concern to older adults, such as health management, smart living, family communication, retirement planning, and hobby development. Educational platforms should establish feedback mechanisms for senior learners and continuously adjust course content and delivery methods to improve practicality, interactivity, and user-friendliness—thus enhancing learners' intrinsic motivation and sustained engagement.

Third, build multi-level social support systems to activate external drivers of learning participation. Social support significantly promotes older adults' participation in online education. Emotional encouragement and technical assistance from family members-particularly adult children-are often key forces enabling older adults to take the first step in learning. Communities should further integrate resources and leverage "neighbor mutual aid + volunteer services" to provide peer learning support, technical guidance, and emotional companionship. Local governments are advised to incorporate elderly digital education into grassroots governance agendas, transforming support networks from informal, naturally formed systems into organized and institutionalized initiatives.

Fourth, implement differentiated city-tier strategies to reduce development disparities across regions. The study finds that city tier moderates the strength of various motivational pathways. In higher-tier cities, efforts should focus on improving the professionalism and adaptability of course content, enhancing platform services, and integrating educational resources. In contrast, in lower-tier cities, priority should be given to improving the accessibility of basic educational services and addressing gaps in device availability, technical support, and social mobilization. It is recommended that governments at all levels develop tier-specific elderly education support policies aligned with urban development stages, thereby promoting a more balanced distribution of educational resources across regions.

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