

Unravelling the Significance of Social Presence in Live E-commerce: An Empirical Exploration Employing Social Presence as an Intermediate Variable

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Abstract: *Live e-commerce is an important e-commerce industry that has emerged in recent years, and due to its diversified scenarios, strong interactivity, and fast growth in user scale, it has become an important way to pull the development of e-commerce. Based on the theoretical analysis, this paper constructs a relationship model of streamer live streaming, social presence, and consumers' purchase intention. Then, a questionnaire survey was carried out in an online way, and the hypothesis testing of the theoretical model was carried out. The results show that: attractiveness, professionalism, and interactivity have significant positive effects on consumers' purchase intention; the mediating effect of social presence is significant, i.e., streamer live streaming promotes consumers' purchase intention by improving the sense of presence. Accordingly, two suggestions are put forward: one is to enhance the consumer experience as the focus of creating a good atmosphere for live streaming, and the other is to emphasize streamer screening and training to create a professional network with strong competence. The second is to emphasize streamer screening and training to create a streamer team with strong professional ability.*

Keywords: Live Streaming; Social Presence; Purchase Intention; Questionnaire Survey; Mediating Effect

1. Introduction

Live e-commerce is booming in China, where online platforms, social media, and influencers create interactive and engaging shopping experiences for millions of consumers. Statista (2023) reports that 526 million live e-commerce users account for 48.8% of China's internet population. China's live-streamed e-commerce market is expected to reach 4.9 trillion RMB (US\$704 billion) by 2023 (Coresight Research, 2023). The main drivers of live e-commerce in China are the mobile-focused internet economy, the integration of e-commerce and social platforms, and the popularity of video content and influencer marketing among Gen Z (Tindall, 2023). Live e-commerce is a powerful business model that leverages online platforms, social media, and influencers to attract and retain customers in China and beyond (HSBC, 2023).

Compared with traditional e-commerce, the biggest feature of live-streaming e-commerce is the sense of experience, strong interactivity, and more diverse consumption scenarios. With the

disappearance of the demographic dividend, the growth rate of China's internet users has begun to decline (McKinsey, 2023). Different from the traditional model, live-streaming e-commerce is a two-way factual interactive consumption mode, in which the host promotes product information based on a specific scenario, and responds to the user's bullet screen in real-time, with strong interactivity and high information-sharing efficiency (Zhang et al., 2022). Through live-streaming e-commerce, consumers not only get the full range of product information that can be obtained in traditional sales channels but also experience the sense of presence and immersion brought by frequent interaction (Kay, 2023). In this scenario, factors such as the herd effect may affect consumer purchase decisions. Therefore, many scholars have begun to introduce the concept of social presence into the study of live-streaming e-commerce. Social presence is the degree to which consumers perceive that they are interacting with real people in a virtual environment (Zhang et al., 2022). Social presence is important in live e-commerce because it can enhance consumers' trust, flow state, and identification with the live streamers, which in turn can increase their purchase intention and impulse buying behavior (Ming et al., 2021; Chen et al., 2023). Social presence can also create a sense of immersion, participation, and belonging for consumers, making them feel more satisfied and loyal to the live-streaming platforms (Kay, 2023).

From the existing studies, scholars have confirmed that streamer characteristics and social presence have a certain impact on purchase intention, but the role mechanism between the three has not been empirically tested. Therefore, this paper describes the streamer characteristics from three perspectives: attractiveness, professionalism, and interactivity, and explores the role mechanism between streamer characteristics, sense of presence, and consumers' purchase intention, aiming to provide some reference for the selection of streamers and content design of live e-commerce.

2. Literature Review

2.1 Live E-commerce

Live e-commerce is a form of online shopping that involves real-time interaction between sellers and buyers through live video streaming. Live e-commerce has become a popular and influential phenomenon in China and other markets, attracting millions of consumers and generating billions of dollars in sales (Wang et al., 2021; Zhou et al., 2022). However, live e-commerce has not received much attention from academic circles, despite its potential implications for consumer behavior, marketing strategies, and social commerce (Xie et al., 2022).

One of the key aspects that distinguishes live e-commerce from traditional e-commerce is the presence of social cues and social interactions, which create a sense of social presence for consumers. Social presence is defined as the degree to which a person feels socially and psychologically connected with others in a mediated environment (Short et al., 1976). Social presence can be influenced by various factors, such as the characteristics of the medium, the source, the message, and the audience (Biocca et al., 2003).

Previous studies have suggested that social presence can affect consumer attitudes and behaviors in online contexts, such as trust, satisfaction, loyalty, engagement, and purchase intention (Hassanein and Head, 2007; Gefen and Straub, 2004; Cyr et al., 2007). However, the existing literature on social presence in live e-commerce is very limited and fragmented, and there is a lack of a comprehensive and systematic understanding of the mechanism and impact of social presence in live e-commerce.

2.2 Social Presence

Social presence is the degree to which a person feels connected to others in a mediated environment, such as live e-commerce platforms or online learning platforms. Social presence has been studied from various perspectives, such as communication, education, psychology, and robotics, but there is no consensus on the definition, measurement, and antecedents of social presence, which hinders the development of a coherent research field (Biocca, Harms, & Burgoon, 2003; Kim, 2017).

In the context of live e-commerce commerce, social presence can be divided into four dimensions: the social presence of live streaming platforms, of viewers, of live streamers, and telepresence. These dimensions act as stimuli that affect consumers' psychological states, such as consumer identification, trust, and flow state, which in turn lead to behavioral responses, such as impulsive buying behavior. Moreover, some personal factors, such as self-improvement and a sense of power, can moderate the effects of social presence on consumers' purchase intention (Chen, Chen, & Chen, 2023; Ming et al., 2021).

Several empirical studies have tested the relationships among social presence, consumer trust, flow state, and impulsive buying behavior in live e-commerce commerce, using structural equation modeling (SEM) or partial least squares (PLS) methods. The results have generally supported the positive and significant effects of social presence on consumers' purchase intention, mediated by consumer trust and flow state. The results have also confirmed the moderating roles of self-improvement and sense of power in the process. These studies have contributed to the theoretical understanding of social presence and its implications for live e-commerce commerce. They have also provided practical suggestions for live streamers, e-retailers, and platform providers to enhance social presence and stimulate consumers' buying behavior (Chen et al., 2023; Ming et al., 2021).

The implications of social presence are manifold, as it can affect various aspects of the mediated experience, such as learning outcomes, user satisfaction, trust, engagement, and well-being. Social presence can also have positive or negative effects depending on the context and the individual. Therefore, it is important to understand the complex and dynamic nature of social presence and its role in mediated communication (Biocca et al., 2003; Kim, 2017).

2.3 Interactivity

Interactivity, defined as the degree of reciprocal communication and feedback between streamers and consumers, is a crucial determinant of consumers' shopping intentions and behaviors in live-streaming e-commerce. However, interactivity is not a monolithic construct but rather consists of multiple dimensions that may have different effects on consumers' psychological and emotional responses, as well as their purchase outcomes. Previous studies have identified and examined various dimensions of interactivity in live-streaming e-commerce, such as:

Interactions for obtaining product information: These enable consumers to acquire more knowledge and details about the products, such as asking questions, requesting demonstrations, or viewing product reviews. These interactions can enhance consumers' perceived social presence, which is the sense of being connected and engaged with the streamer and other consumers, and increase their product involvement, which is the degree of personal relevance and interest in the product (Joo & Yang, 2023; Liu et al., 2022).

Interactions for grasping the purchase dynamics of others: These allow consumers to observe and follow the purchase behaviors and opinions of other consumers, such as viewing the number of viewers, likes, comments, or purchases. These interactions can influence consumers' consumer conformity, which is the tendency to conform to the norms and expectations of other consumers and affect their purchase intentions (Liu et al., 2022).

Interactions for obtaining monetary incentives: These provide consumers with opportunities to receive discounts, coupons, or rewards for participating in live-streaming e-commerce, such as playing games, joining lucky draws, or sharing links. These interactions can satisfy consumers' user gratification, which is the pleasure and enjoyment derived from using live-streaming e-commerce, and increase their immersion, which is the degree of involvement and absorption in the live-streaming experience (Joo & Yang, 2023).

In addition, the effects of interactivity may vary depending on the type of product (search or experience) and the characteristics of the streamer (human or virtual). Search products are those that can be evaluated based on objective attributes, such as price, size, or quality, while experience products are those that can only be evaluated based on subjective attributes, such as taste, style, or feeling. Previous studies have suggested that interactivity may have a stronger impact on consumers' purchase intentions for experience products than for search products, as experience products require more sensory and emotional information that can be provided by live-streaming e-commerce (Chang et al., 2023; Liu et al., 2022). Furthermore, streamers can be either human or virtual, depending on whether they use their real or artificial appearance and voice. Previous studies have indicated that virtual streamers can enhance consumers' experiential value, which is the overall value and satisfaction derived from using live streaming e-commerce, by increasing their perceived socialness, which is the degree of human-like and friendly attributes of the streamer (Wu et al., 2023).

Interactivity is thus a complex and multifaceted construct that requires further investigation and measurement in the context of live-streaming e-commerce. Future studies should explore how interactivity can be optimized and customized to suit different products, streamers, and consumers, and how interactivity can be integrated with other factors, such as trust, credibility, and loyalty, to create a successful and sustainable live streaming e-commerce model.

2.4 Professionalism

Live streamers can be considered social media influencers who create value for themselves and others through their personality, content, and social capital. The professionalism of live streamers refers to the extent to which they exhibit qualities such as expertise, credibility, and reliability in their live-streaming activities. Professionalism can affect the streamers' popularity, income, and influence on their viewers.

Some studies have explored the characteristics and factors that contribute to the professionalism of live streamers. For example, Zhao, Hu, Hong, and Westland (2020) examined the personality, professionalism, and streaming affordance of streamers on Twitch, a leading live-streaming platform. They found that certain personality traits, such as openness, were negatively associated with the streamers' popularity, while professional players and streamers who provided more social affordance, such as profile building, social connectivity, and social interactivity, were more likely to attract a larger viewer base.

Another study by Chen, Li, and Zhang (2021) investigated the influence of streamers' social capital on viewers' purchase intention in live-streaming e-commerce, a new form of online

retailing that combines live streaming and product promotion. They measured the streamers' social capital by three dimensions: professionalism, reciprocal expectation, and parasocial relationship. They found that the streamers' professionalism, the reciprocal expectation of live streaming, and the viewers' parasocial relationship could effectively increase the viewers' purchase intention. However, the occurrence of streamers' negative public events could significantly reduce the viewers' purchase intention.

Other studies have focused on the practices and challenges of live streamers in different contexts and cultures. For example, Lu, Niu, and Huang (2018) conducted a qualitative study of live streaming practices in China, where live streaming is a booming industry that attracts millions of streamers and viewers. They identified four types of streamers based on their motivations and goals: professional, amateur, hobbyist, and social. They also discussed the streamers' strategies for attracting and retaining viewers, such as providing rewards, playing games, and performing talents. They highlighted the streamers' difficulties in balancing their personal and professional lives, dealing with competition and harassment, and maintaining their authenticity and identity.

These studies show that the professionalism of live streamers is a complex and multifaceted concept that involves various aspects of the streamers' personality, skills, behavior, and social relationships. The professionalism of live streamers can have significant implications for their success and impact in the live-streaming industry and beyond.

2.5 Attractiveness

The attractiveness of live streamers is a key factor that influences viewers' behavior and perception in live streaming commerce, a new form of online retailing that combines live video and product promotion. Attractiveness can be defined as the degree to which streamers possess characteristics such as personality, appearance, and talent that appeal to viewers (Ha and Lam 2016). Attractiveness can affect viewers' social presence, emotional attachment, trust, satisfaction, and purchase intention in live-streaming commerce.

Some studies have explored the antecedents and consequences of the attractiveness of live streamers. For example, Chen and Liao (2022) examined the impact of a sense of community, emotional support, and interactivity on viewers' social presence, which, in turn, influences their live streaming watching. They also investigated the moderating role of streamer attractiveness in the relationship between social presence and live streaming watching. They found that streamer attractiveness plays a significant moderating role, such that the positive effect of social presence on live streaming watching is stronger when streamer attractiveness is high.

Another study by Liu, Zhang, and Li (2023) investigated the influence of streamer attractiveness on viewers' emotional attachment, trust, satisfaction, and purchase intention in live-streaming commerce. They measured streamer attractiveness by three dimensions: physical attractiveness, social attractiveness, and task attractiveness. They found that streamer attractiveness positively affects viewers' emotional attachment, trust, satisfaction, and purchase intention. They also found that emotional attachment and trust mediate the relationship between streamer attractiveness and satisfaction, and satisfaction mediates the relationship between streamer attractiveness and purchase intention.

Other studies have focused on the interaction and immersion effects of the attractiveness of live streamers. For example, Xie, Wang, and Wang (2023) proposed an interaction–immersion model in live-streaming commerce, based on the theory of flow and social presence. They

examined the impact of interaction immersion and content immersion on viewers' impulse buying. They also explored the moderating role of streamer attractiveness in the relationship between interaction immersion and impulse buying. They found that interaction immersion and content immersion positively affect viewers' impulse buying. They also found that streamer attractiveness moderates the effect of interaction immersion on impulse buying, such that the positive effect of interaction immersion on impulse buying is stronger when streamer attractiveness is high.

These studies show that the attractiveness of live streamers is a crucial factor that shapes viewers' experience and behavior in live-streaming commerce. The attractiveness of live streamers can enhance viewers' social presence, emotional attachment, trust, satisfaction, and purchase intention, as well as influence the interaction and immersion effects of live streaming.

2.6 Research hypothesis and conceptual framework

i. The relationship between streamer attractiveness and purchase intention.

When streamers stream, they usually show strong affinity and display personal charisma. This inner and outer beauty will be attractive to consumers and make them willing to stay in the live streaming room to watch the live streaming. In addition, the stronger personal charisma also makes the information conveyed easier to be accepted by consumers, thus increasing the willingness to buy products. Some studies have confirmed that there is a significant positive correlation between streamer attractiveness and consumer acceptance of streamer-recommended products, and products recommended by streamers with stronger attractiveness are more likely to be recognized by consumers (Zheng Yu and Yang Su, 2022). Through the analysis of the Taobao store, it is found that streamer personal charisma is an important factor influencing consumers' purchase intention (Yifan Zhang, 2022; Juan Yang 2022). Therefore, hypothesis H1a of this paper is proposed:

H1a: streamer attractiveness can significantly increase consumer purchase intention.

ii. The relationship between professionalism and purchase intention.

When consumers purchase products through streamer live streaming, the main source of product information obtained is the streamer's explanation of the product. In this process, the streamer's professional knowledge of the product is an important factor that affects consumers' feelings. Streamers with strong professional knowledge describe product parameters, quality characteristics, and product performance more meticulously and accurately during the live broadcast, which has higher credibility and is easy to arouse consumers' willingness to buy. Wang Rui's (2022) study confirms that streamer expertise has a significant effect on consumer purchase intention. Drama Xiaoxian (2022) pointed out that when the streamer's professionalism is high, consumers are more willing to consult product information with them, which reduces the expected risk and contributes to the purchase intention. Huang (2022) argued that the specialized description of products in a streamer's live streaming can improve consumers' purchase intention. Therefore, the hypothesis H1b is proposed:

H1b: streamer professionalism can significantly increase consumer purchase intention.

iii. The relationship between interactivity and purchase intention.

The real-time interaction between the streamer and the consumer during the live streaming will bring the two sides closer, enhance the consumer's sense of intimacy, and alleviate to a certain extent the uncertainties that may exist in online purchasing, thus affecting the consumer's purchase intention. Wang Rui's (2022) study confirmed that the interaction between consumers

and merchants is an important factor influencing consumers' purchasing decisions. Bodan Zhang (2022) found that the frequency and level of interaction between the streamer and the consumer had a significant positive effect on the purchase decision. Ning Lili and Zhu Yang (2022) pointed out that the interaction between streamer and viewer directly affects purchase intention in apparel live streaming. Therefore, the hypothesis H1c of this paper is proposed:

H1c: streamer interactivity can significantly increase consumer purchase intention.

iv. The personal charisma of the streamer can create a sense of trust and intimacy among consumers and stimulate a sense of social presence.

Qu (2022) found that interactivity and socialization in live streaming can increase consumers' social presence, and social presence promotes consumers' purchase intention. Gong Si-Ying (2021) pointed out that real-time interaction and exchange of feedback between consumers and sellers, and between consumers and consumers is an important method to increase the sense of social presence, which is also very important for improving consumers' trust in online platforms. Jiang Liqun and Wang Yuan (2022) found that social presence will make consumers feel pleasure and enhance the trust between consumers and streamers, thus effectively increasing purchase intention. In addition, a more professional streamer is able to present product information comprehensively and accurately, immersing consumers in the live broadcasting scene, increasing the sense of presence, and improving purchase intention. Therefore, the hypotheses H2a, H2b, H2c are proposed in this paper:

H2a: Social presence mediates between streamer attractiveness and purchase intention.

H2b: Social presence mediates between streamer professionalism and purchase intention.

H2c: Social presence mediates the relationship between streamer interactivity and purchase intention.

Based on all the hypotheses above, the conceptual framework can be drawn in the following:

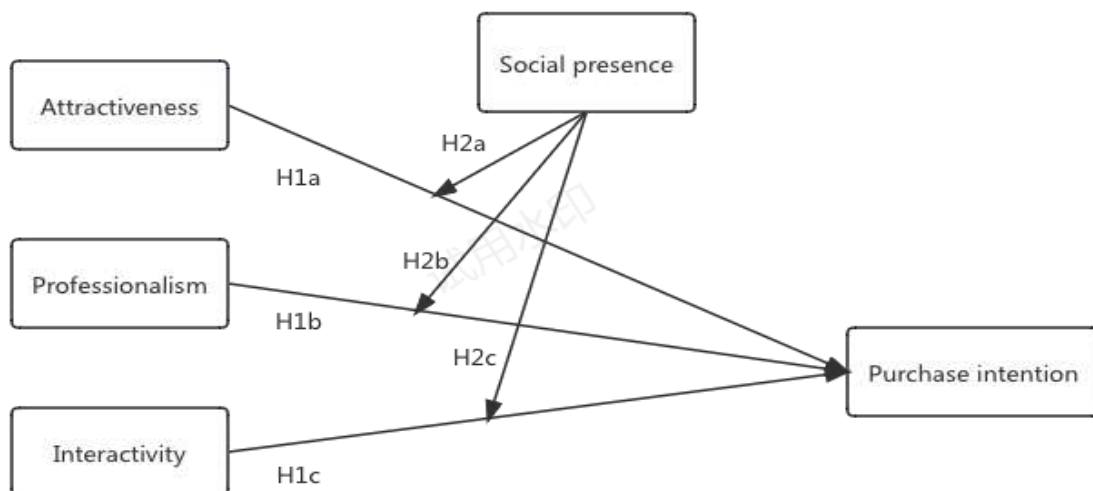


Figure 1: Conceptual Framework

3. Methodology

3.1 Study variable measurement and scale design

This study adopted a four-dimensional framework to measure the characteristics of live streamers, namely interactivity, professionalism, and Attractiveness. The scales for each dimension were derived from the existing literature (Kaltura 2021; Twilio 2021; Liu et al. 2022; Restream 2022; Hou 2021) and adapted to the specific context of live e-commerce. Table 1 below presents the detailed operationalization of the four dimensions.

Table 1: Streamer Characteristic Measurement Scale.

Characteristic	NO.	Measurement Scale	References
Interactivity	INT1	The streamer makes me feel involved and engaged in the live broadcast.	Kaltura (2021) Twilio (2021)
	INT2	The streamer encourages me to participate and interact with them and other consumers.	
	INT3	The streamer listens to and acknowledges my comments and feedback.	
	INT4	The streamer provides me with relevant and useful information and recommendations.	
Professionalism	SPE1	The streamer has sufficient knowledge and skills in the relevant field.	Liu et al. (2022)
	SPE2	The streamer provides accurate and honest information about the products or services they promote	
	SPE3	The streamer follows ethical and legal standards in their live broadcasts	
	SPE4	The streamer enhances their credibility and reputation by using endorsements, testimonials, or ratings	
Attractiveness	AF1	The streamer has a pleasant and engaging communication style	Restream (2022) Hou (2021)
	AF2	The streamer has a natural and appropriate emotional expression	
	AF3	The streamer has an attractive and professional impression management	
	AF4	The streamer has a unique and consistent personal brand	

In terms of social presence, this study adopted a four-dimensional framework to measure it. The scales for each dimension were derived from the existing literature based on the article by Kreijns et al. (2021) who suggest that social presence can be defined as the degree of “realness” of other persons in the interaction, and can be measured by four dimensions: intimacy, immediacy, expressiveness, and salience. They also distinguish social presence from two related constructs: sociability and social space. They argue that their new conceptualization and measurement of social presence can contribute to more coherent and rigorous research on online group learning. Table 2 below presents the detailed operationalization scale of the four dimensions.

Table 2: Social Presence Measurement Scale.

	NO.	Measurement Scale	References
Social presence	PRE1	How close do you feel to the streamer?	Kreijns et al. (2021)
	PRE2	How immediate do you perceive the streamer’s responses?	
	PRE3	How expressive do you find the streamer’s communication?	
	PRE4	How salient do you perceive the streamer’s presence?	

This study employed a four-dimensional framework to assess purchase intention. The measurement items for each dimension were adapted from the extant literature, drawing on the

work of Zhang et al. (2023), who propose that five IT affordances can enhance trust: visibility, metavoicing, trading, guidance shopping, and interactivity. The four dimensions of purchase intention are attitude, subjective norm, perceived behavioral control, and perceived risk. Table 3 shows the operationalization of these dimensions. Table 3 below presents the detailed operationalization scale of the four dimensions.

Table 3: Purchase Intention Measurement Scale.

	NO.	Measurement Scale	References
Purchase Intention	PUI1	I like to buy products from live stream marketing.	Zhang et al. (2023)
	PUI2	People who are important to me think that I should buy products from live stream marketing.	
	PUI3	I have the resources, knowledge, and ability to buy products from live stream marketing.	
	PUI4	Buying products from live stream marketing is risky.	

3.2 Research questionnaire design

This study used a questionnaire survey to gather data from live streaming customers. The questionnaire items were based on the existing scales and rated on a seven-point Likert scale (1 = strongly disagree; 7 = strongly agree). A bilingual expert translated the questionnaire from English to Chinese to ensure its validity. The questionnaire had three sections: the first section collected the respondents' demographic information; the second section inquired about their live streaming consumption behavior, such as the platforms they used, the products they bought, and the reasons they did not buy. The third section assessed their perceptions of five key variables: the professionalism of the streamer, the interactivity of the streamer, the attractiveness of the streamer, social presence, and their purchase intention. The third section was the main part of the questionnaire and provided the data for statistical analysis (see Table 1,2,3).

This study adopted an online survey method to obtain a large and diverse sample of respondents and improve the reliability of the analysis results. We distributed the survey link through social media platforms such as WeChat and QQ and incentivized respondents to spread and forward it to their contacts by offering them pocket money. This snowball sampling technique allowed us to collect 458 responses. After removing the responses that had duplicate answers to multiple questions, we kept 417 valid responses for the final data analysis. The response rate was 91.04%

3.3 Model Construction

Drawing on the results of previous research, we construct a model of the relationship between streamer live streaming and consumer purchase intention, as shown in Equation

$$(1): PUI_i = \alpha_0 + \alpha_1 AF_i + \alpha_2 SPE_i + \alpha_3 INT_i + \alpha_4 Control_i + \epsilon_i \quad (1)$$

In equation (1), PUI is purchase intention, AF is streamer attractiveness, SPE is streamer professionalism, and INT is streamer interactivity. The control variables include respondents' age, gender, education, and average monthly salary. and ϵ denotes the random error term.

In order to determine whether the streamer live streaming increases the purchase intention through the sense of presence, the following model is constructed to determine the mediating effect of the sense of presence:

$$PRE_i = \beta_0 + \beta_1 AF_i + \beta_2 SPE_i + \beta_3 INT_i + \beta_4 Control_i + \epsilon_i \quad (2)$$

$$PUI_i = \gamma_0 + \gamma_1 AF_i + \gamma_2 SPE_i + \gamma_3 INT_i + \gamma_4 PRE_i + \gamma_5 Control_i + \epsilon_i \quad (3)$$

In equation (2)(3), PRE is the social presence, and the meanings of the other variables are the same as those in equation (1).

4. Data Analysis

4.1 Descriptive statistical analysis

This study used descriptive statistical analysis to summarize, present, and explain the features of the data and to perform initial validation of the data quality. We reported the basic information of the sample group, such as their gender, age, education level, and their experience of buying products recommended by live streamers. The software output showed that the sample group was composed of 44.4% males and 55.6% females, with a fairly balanced gender distribution and a slight female predominance. This indicated that women might be more inclined to participate in live shopping than men. The majority of the respondents (69.9%) were aged between 19 and 30 years old, which demonstrated that young people were more cognizant of and curious about the latest trends. This suggested that young people had a higher acceptance of new phenomena such as live shopping and were more likely to interact with this new business model. The respondents with a college degree or higher represented 61.1% of the sample group, which implied that people with higher education levels were more open to new things.

This study used online questionnaires as the main method of data collection, which resulted in a fairly balanced occupational distribution of the survey group and a consistent monthly disposable income. Table 4 presents the details of these items.

Table 4: Descriptive statistical analysis

Items	Category	Frequency	Valid Percentage
Gender	male	185	44.4
	female	232	57.6
Age	Below 18	40	9.6
	19~25	176	42.3
	26~30	115	27.6
	31~40	62	15.1
	Above 41	24	5.4
Highest Education	Middle school or below	63	15.1
	High school	99	23.8
	College	185	44.4
	Master or above	69	16.7
Income	1 000 or below	40	9.6
	1 000~3 000	44	10.5
	3 001~5 000	103	24.7
	5 001~8 000	102	24.7
	8 001~10 000	68	16.3
	10 001 or above	59	14.2
Occupation	student	42	10.0
	Company staff	144	34.7
	Civil servant	80	19.2
	State institutions	101	24.3
	Freelancing	49	11.7

4.2 Reliability and validity test

Cronbach's α coefficient and CITC were used to test the reliability of the questionnaire, and the results are shown in Table 4. The judgment standard of Cronbach's α is 0.7, and when the Cronbach's α coefficient of a variable is greater than 0.7, it means that the reliability meets the requirements; the judgment standard of CITC is 0.5, and if the CITC of a question is greater than 0.5, it indicates that the reliability of the questionnaire is good. Cronbach's α is 0.7, when the Cronbach's α coefficient of the variable is greater than 0.7, it means that the reliability meets the requirements; CITC is 0.5, if the CITC of the question item is greater than 0.5, it means that the questionnaire reliability is better. According to Table 5, Cronbach's α coefficients of attractiveness, professionalism, and interactivity of streamer are 0.932, 0.965, and 0.884 respectively, which satisfy the reliability requirements. The Cronbach's alpha coefficients of sense of presence and willingness to buy are 0.928 and 0.938 respectively, which are greater than 0.7, and the reliability of the questionnaire is good.

Table 5: Reliability test

Variables	No.	Citc	Cronbach A After Removing Terms	Cronbach A
Attractiveness (AF)	AF1	0.925	0.880	0.932
	AF2	0.807	0.920	
	AF3	0.781	0.928	
	AF4	0.844	0.908	
Professionalism (SPE)	SPE1	0.915	0.952	0.965
	SPE2	0.935	0.947	
	SPE3	0.894	0.958	
	SPE4	0.904	0.956	
Interactivity (INT)	INT1	0.797	0.831	0.884
	INT2	0.712	0.864	
	INT3	0.682	0.875	
	INT4	0.799	0.830	
Social presence (PRE)	PRE1	0.788	0.921	0.928
	PRE2	0.917	0.877	
	PRE3	0.836	0.905	
	PRE4	0.791	0.920	
Purchase Intention (PUI)	PUI1	0.843	0.923	0.938
	PUI2	0.852	0.920	
	PUI3	0.858	0.918	
	PUI4	0.860	0.917	

The validity of the questionnaire was judged by KMO and Bartlett's sphere test, and the results are shown in Table 6. According to Table 6, the KMO values of streamer attractiveness, professionalism, and interactivity are 0.826, 0.862, and 0.827 respectively, which are all greater than 0.7, and the validity of the scale is good. In addition, the results of Bartlett's sphere test showed that the p-value of 0.000, which rejects the original hypothesis that there is no correlation between the original variables at the 1% significance level, i.e., there is a correlation between the variables, and the validity is good.

Table 6: Analysis of the validity of each variable

Variable	KMO	Bartlett Sphere Test		
		chi-square	degrees of freedom	Sig.
Attractiveness	0.826	1287.24	6	0.000
Professionalism	0.862	1792.94	6	0.000
Interactivity	0.827	796.66	6	0.000
Social presence	0.822	1232.58	6	0.000
Purchase Intention	0.866	1253.18	6	0.000

4.3 Benchmark regression model

Equation (1) was fitted using SPSS software and the results are shown in Table 7. Column 1 shows the regression results without control variables in the model, and column 2 shows the regression results with control variables in the model.

According to Table 7, the coefficient of streamer attractiveness (AF) on consumer purchase intention (PUI) is 0.235 when no control variables are added, which is significant at a 1% level of significance, indicating that streamer attractiveness has a positive promotion effect on consumer purchase intention, and the hypothesis **H1a is verified**.

The coefficient of streamer professionalism (SPE) on consumer purchase intention (PUI) is 0.142, which is significant at a 1% level of significance, indicating that Netflix professionalism can significantly promote consumers' purchase intention, hypothesis **H1b is verified**.

The coefficient of streamer interactivity (INT) on consumer purchase intention (PUI) is 0.203, which is significant at a 1% level of significance, indicating that streamer interactivity can significantly enhance consumer purchase intention, and hypothesis **H1c is verified**.

After adding the control variables, the coefficients of the above three variables do not fluctuate much and are still significantly positive at the 1% significance level, indicating that the results are robust.

Combined with the previous theoretical analysis, if the streamer's livestream has a strong attraction, the user's attention is more likely to be attracted by the streamer, and the interest in the product will be increased as a result. After obtaining more product information through watching the livestream, they are more likely to have a purchase intention. In addition, when the streamer's professionalism is strong, its display of product information is more systematic, accurate, and comprehensive, and it can convey the product performance and product quality to the user in a more vivid way so that the consumer is more agreeable to the products recommended by the streamer, which in turn improves the willingness to buy. Finally, the biggest difference between streamer live E-commerce and traditional e-commerce is that it is more interactive, streamer lives by answering the questions raised by users in real-time and displaying the products according to the needs of the users, increasing the understanding of the users of the product information, breaking the users' doubts and thus increasing the willingness to buy.

Table 7: Benchmark model regression results

Variable	Explained variables : PUI	Explained variables : PUI
AF	0.235***(2.56)	0.265***(8.12)
SPE	0.142***(4.38)	0.154***(0.12)
INT	0.203***(6.06)	0.214***(-3.42)
Gen	-	8.268***(1.13)
Age	-	5.331***(0.22)
Edu	-	7.031***(8.26)
Inc	-	1.543***(3.95)
Constant terms	72.602***(24.34)	26.422***(15.65)
Adj.R ²	0.632	0.746

Note: ***, **, * denote significant at 1%, 5%, 10% levels respectively.

4.4 Mediating effects of social presence

The results of the test for the mediating effect of social presence are shown in Table 8. In particular, the explanatory variable in column 1 is social presence (PRE), and the explanatory variable in column 2 is consumer purchase intention (PUI). According to the results in Column 1, the regression coefficients of streamer attractiveness (AF), streamer professionalism (SPE), and streamer interactivity (INT) on the sense of presence are 0.313, 0.207, and 0.155 respectively. The regression coefficients of streamer attractiveness (AF), streamer professionalism (SPE), and streamer interactivity (INT) on the sense of presence are 0.313, 0.207, and 0.155, respectively, which are significantly positive at 1% significance level. This indicates that the stronger the attractiveness, professionalism, and interactivity of the streamer, the higher the sense of social presence felt by consumers.

According to the results in Column 2, the regression coefficients of streamer attractiveness (AF), streamer professionalism (SPE), and streamer interactivity (INT) on the sense of presence are 0.353, 0.345, and 0.161, respectively, and all of them are significantly positive at 1% significance level, which is consistent with the regression results of model (1).

The regression coefficient of social presence (PRE) is 0.149, which is significantly positive at 1% significance level, indicating that the mediating effect of social presence is significant, and the hypotheses **H2a, H2b, H2c are verified**. streamer live broadcasting can improve the social presence of consumers, which leads to the rise of users' purchase intention. When the sense of social presence is high, consumers can feel that they are in a real shopping environment.

When the sense of social presence is high, consumers can feel that they are in a real shopping environment, have a more intimate relationship with the streamer and other consumers, and can experience a sense of social interaction through interaction with the streamer and other consumers. and can experience a sense of socialization through interaction with the web celebrities and other consumers. In this case, consumers will have a higher sense of identification with the streamer and the products recommended by the streamer, and thus their consumption intention will be increased.

Table 8: Results of the mediating effect test for social presence

Variable	Explained variables: PRE	Explained variables: PUI
AF	0.313*** (4.32)	0.353*** (7.23)
SPE	0.207*** (5.37)	0.345*** (5.46)
INT	0.155*** (5.32)	0.161*** (3.82)
PRE	-	0.149*** (7.20)
Gen	0.892*** (3.92)	0.955** (6.20)

Age	0.979 (0.44)	1.222 (0.91)
Edu	1.050*** (7.10)	1.305* (7.98)
Inc	0.520 (0.91)	0.075** (6.08)
Constant terms	32.652*** (25.74)	36.445*** (25.63)
Adj.R ²	0.732	0.726

Note: ***, **, * denote significant at 1%, 5%, 10% levels respectively.

5. Conclusion and Recommendation

Streamer live streaming is an important e-commerce industry that has emerged in recent years and has become an important sales channel commonly adopted by merchants residing on major e-commerce platforms due to its diversified scenarios, strong interactivity, and fast growth of user scale. Based on the existing literature, this paper examines live streaming from the dimensions of attractiveness, professionalism, and interactivity, constructs a relationship model between streamer live streaming and consumers' purchase intention, and examines whether social presence plays a mediating role between streamer live streaming and purchase intention. Based on the empirical results, the following two recommendations are made:

(1) Create a favorable live streaming atmosphere with a focus on enhancing consumer experience. The empirical results show that streamer attractiveness, professionalism, and interactivity can all improve consumers' purchase intention. Therefore, on the basis of fully protecting consumers' rights and interests, we should further improve consumers' shopping experience when watching streamers live streaming, and create a highly interactive, professional, and harmonious live-streaming atmosphere. live streaming is not only the introduction and promotion of the product, but also a continuous process of customer management and customer maintenance, and we should fully output high-quality information about the product's performance, product quality, etc., and actively respond to consumers' concerns and questions. It should fully output high-quality information about product performance, product quality, and other aspects, actively respond to consumer concerns and questions, improve the stickiness of the live broadcast, and cultivate loyal users of streamed live.

(2) Emphasis is placed on streamer screening and training to create a team of streamers with strong professional abilities. Since Taobao launched e-commerce live streaming, the number of streamers has been growing, and the quality of the winners and losers has also been realized. With the maturity of the live streaming mode, consumers are demanding more and more of the streamer's professional ability. Merchants should strengthen the screening and training of streamers to create a streamer team with strong appeal and high professional quality to better meet consumer demand. In addition, merchants should choose a streamer that matches the brand culture, spread the brand image through the streamer, and increase the user's sense of social presence and brand identity.

References

- Beatty S.E., & Ferrell M.E. (1998). Impulse buying: Modeling its precursors. *Journal of Retailing*, 74 (2), 169-191.
- Biocca, F., Harms, C., & Burgoon, J. K. (2003). Toward a more robust theory and measure of social presence: Review and suggested criteria. *Presence: Teleoperators & Virtual Environments*, 12(5), 456-480.

- Chang, C. C., Teng, C. I., & Lin, C. H. (2023). How streamers foster consumer stickiness in live streaming sales. *Journal of Theoretical and Applied Electronic Commerce Research*, 18(3), 61-79. <https://doi.org/10.4067/S0718-18762023000300105>
- Chen, J., & Liao, J. (2022). Antecedents of viewers' live streaming watching: A perspective of social presence theory. *Frontiers in Psychology*, 13, 839629. <https://doi.org/10.3389/fpsyg.2021.839629>
- Chen, L., Chen, F., & Chen, D. (2023). Effect of social presence toward livestream e-commerce on consumers' purchase intention. *Sustainability*, 15(4), 3571. <https://doi.org/10.3390/su15043571>
- Chen, Y., Li, X., & Zhang, Y. (2021). Influence of streamer's social capital on purchase intention in live streaming e-commerce. *Frontiers in Psychology*, 12, 748172. <https://doi.org/10.3389/fpsyg.2021.748172>
- Coresight Research. (2023). Think Tank: The Livestreaming E-Commerce Revolution in China. Retrieved from <https://coresight.com/research/think-tank-the-livestreaming-e-commerce-revolution-in-china/>
- Cyr, D., Hassanein, K., Head, M., & Ivanov, A. (2007). The role of social presence in establishing loyalty in e-service environments. *Interacting with Computers*, 19(1), 43-56.
- Gefen, D., & Straub, D. W. (2004). Consumer trust in B2C e-commerce and the importance of social presence: Experiments in e-products and e-services. *Omega*, 32(6), 407-424.
- Hassanein, K., & Head, M. (2007). Manipulating perceived social presence through the web interface and its impact on attitude towards online shopping. *International Journal of Human-Computer Studies*, 65(8), 689-708.
- Hou F., Zhang Y., & Guo W., 2021. Analysis on the Development Trend of E-commerce Live Streaming. *Journal of Physics: Conference Series*.
- HSBC. (2023). E-commerce and Livestream Shopping in China - A Complete Guide. Retrieved from <https://www.business.hsbc.com.tw/en-gb/tw/article/e-commerce-and-livestream-shopping-in-china-a-complete-guide>
- Joo, E., & Yang, J. (2023). How perceived interactivity affects consumers' shopping intentions in live stream commerce: roles of immersion, user gratification and product involvement. *Journal of Research in Interactive Marketing*, 17(5), 754-772. <https://doi.org/10.1108/JRIM-02-2023-0039>
- Kaltura (2021). Interactive Live Stream: 5 Ways to Engage Your Viewers. Retrieved from <https://corp.kaltura.com/blog/interactive-live-stream/>
- Kay, M. (2023). Live shopping: The ultimate guide to livestream selling. Retrieved from <https://www.emerald.com/insight/content/doi/10.1108/IJWIS-02-2021-0012/full/html>.
- Liu L. (2022). Factors affecting consumers' purchasing behaviours in live streaming e-commerce: A review. In *Proceedings of the 2022 2nd International Conference on Economic Development and Business Culture (ICEDBC 2022)* (pp.508-515).
- Liu, B. (2022). How social presence affects viewers' impulse buying behavior in live streaming commerce. *Journal of Economics, Business and Management*, 11(3), 745-751.
- Liu, F., Wang, Y., Dong, X., & Zhao, H. (2022). Marketing by live streaming: How to interact with consumers to increase their purchase intentions. *Frontiers in Psychology*, 13, 933633. <https://doi.org/10.3389/fpsyg.2022.933633>
- Liu, Y., Zhang, Y., & Li, X. (2023). The influence of streamer attractiveness on viewers' purchase intention in live streaming commerce. *Electronic Commerce Research and Applications*, 50, 101121. <https://doi.org/10.1016/j.elerap.2021.101121>

- Lu, Y., Niu, J., & Huang, Y. (2018). You watch, you give, and you engage: A study of live streaming practices in China. In Proceedings of the 2018 CHI Conference on Human Factors in Computing Systems (pp. 1-13). <https://doi.org/10.1145/3173574.3174031>
- Ming, J., Jianqiu, Z., Bilal, M., Akram, U., & Fan, M. (2021). How social presence influences impulse buying behavior in live streaming commerce? The role of S-O-R theory. *International Journal of Web Information Systems*, 17(4), 1-23. <https://doi.org/10.1108/IJWIS-02-2021-0012>
- Ming, J., Jianqiu, Z., Bilal, M., Akram, U., & Fan, M. (2021). How social presence influences impulse buying behavior in live streaming commerce? The role of S-O-R theory. *International Journal of Web Information Systems*, 17(4), 1-24.
- Restream (2022). Why and How to Live Stream a Product Launch. Retrieved from <https://restream.io/blog/how-to-boost-your-new-product-launch-with-live-streaming/>
- Short, J., Williams, E., & Christie, B. (1976). *The social psychology of telecommunications*. John Wiley & Sons.
- Statista. (2023). Number of live-commerce users in China from December 2019 to June 2023. Retrieved from <https://www.statista.com/statistics/1123830/china-live-commerce-users/>
- Tindall, R. (2023). Why is live commerce so popular in China? Retrieved from <https://www.cbbc.org/news/why-is-live-commerce-so-popular-in-china/>
- Twilio (2021). Interactive Live Streaming in 2022 (Tips, Uses, & Platforms). Retrieved from <https://www.twilio.com/blog/interactive-live-streaming>
- Wang, H., Ding, J., Akram, U., Yue, X., & Chen, Y. (2021). An empirical study on the impact of e-commerce live features on consumers' purchase intention: From the perspective of flow experience and social presence. *Information*, 12(8), 324.
- Wu, R., Liu, J., Chen, S., & Tong, X. (2023). The effect of E-commerce virtual live streamer socialness on consumers' experiential value: an empirical study based on Chinese E-commerce live streaming studios. *Journal of Research in Interactive Marketing*, 17(5), 714-733. <https://doi.org/10.1108/JRIM-01-2023-0027>
- Xie, C., Li, Y., Zhang, Y., & Wang, F. (2022). How live streaming changes shopping decisions in e-commerce: A study of live streaming commerce. *Computer Supported Cooperative Work (CSCW)*, 1-32.
- Xie, Y., Wang, Y., & Wang, Y. (2023). An interaction-immersion model in live streaming commerce: the moderating role of streamer attractiveness. *Journal of Marketing Management*, 39(1-2), 1-24. <https://doi.org/10.1080/0267257X.2021.1974729>
- Zhang, L., Chen, M., & Zamil, A. M. A. (2023). Live stream marketing and consumers' purchase intention: An IT affordance perspective using the S-O-R paradigm. *Frontiers in Psychology*, 14, 1069050. <https://doi.org/10.3389/fpsyg.2021.1069050>
- Zhang, Y., Wang, X., & Li, Y. (2022). How live streaming changes shopping decisions in e-commerce: A study of Taobao live. *Computer Supported Cooperative Work (CSCW)*, 31(3-6), 609-643. <https://doi.org/10.1007/s10606-022-09439-2>
- Zhao, K., Hu, Y., Hong, Y., & Westland, J. C. (2020). Understanding characteristics of popular streamers on live streaming platforms: Evidence from Twitch.tv. *Journal of the Association for Information Systems*, 21(6), 1539-1566. <https://doi.org/10.17705/1jais.00647>
- Zhou, R., Tong, L. (2022). A study on the influencing factors of consumers' purchase intention during livestreaming e-commerce: The mediating effect of emotion. *Frontiers in Psychology*, 13, 903023