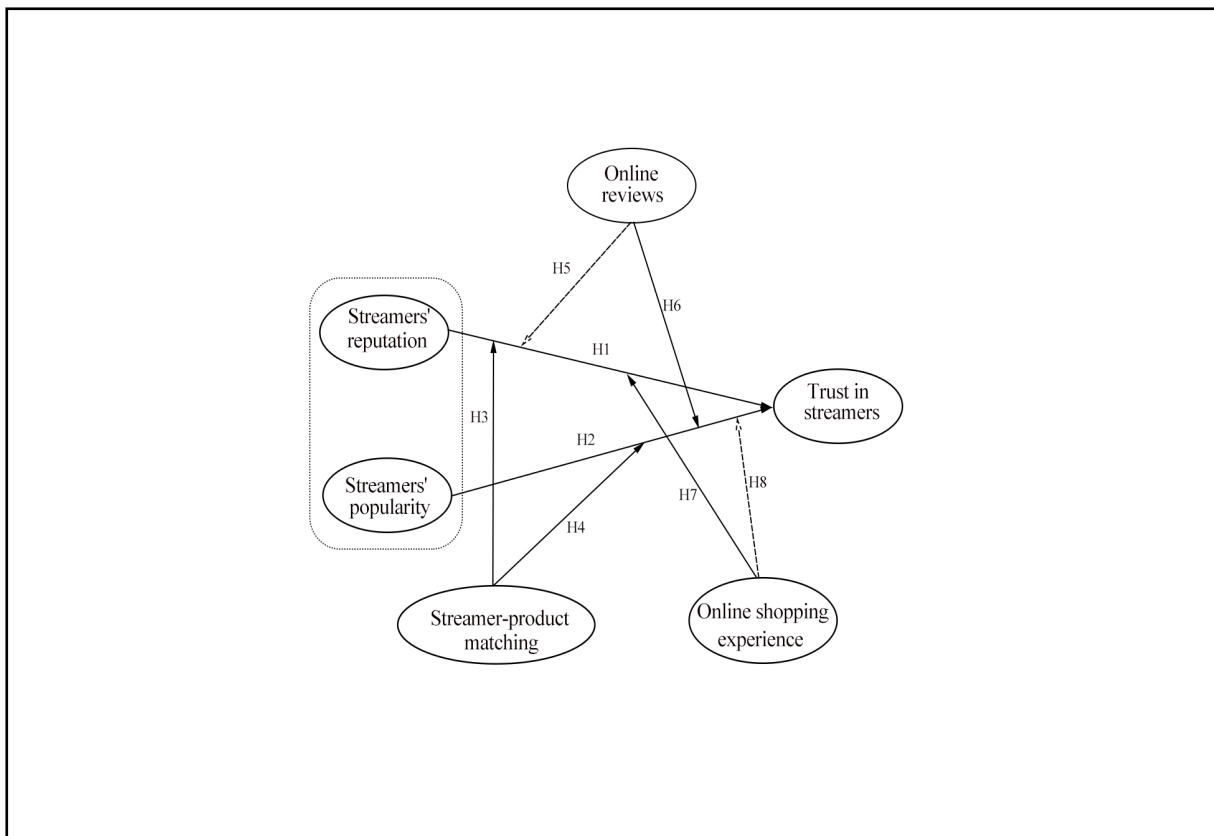# The influence and moderating effect of trust in streamers in a live streaming shopping environment

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Graphical abstract

This is the hypothesis test result of this study. Two hypotheses, H5 and H8, are not supported.

Public summary

■ This study explains the observed phenomenon of "why more consumers prefer some specific streamers, such as Jiaqi Li".

■ Applying the matching theory to the live streaming shopping environment and expanding the research on celebrities to streamers. The results show that the matching theory is still effective in the live streaming shopping environment.

■ Online reviews and online shopping experience have different moderating effects on trust in streamers. And they are only partially effective in moderating trust in streamers in the live streaming shopping environment.

The influence and moderating effect of trust in streamers in a live streaming shopping environment

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Abstract: With its powerful real-time interaction and rich user experience, live streaming shopping has rapidly become consumers' new favorite. However, the frequent "rollover" incidents affecting the reputation of well-known streamers significantly reduce consumers' trust in the streamers. Academic research on trust in live streaming shopping has thus far mainly focused on purchase motivations. Few studies have focused on the factors influencing trust from the streamer's perspective, and they have ignored the moderating role of streamers and product factors, situational factors and individual characteristics of consumers. Therefore, this study introduces three new moderating variables – streamer-product matching, live streaming online reviews, and online shopping experience – to explore their moderating effects on streamers' reputation, popularity, and trust. The results show that streamers' reputation and popularity have a significant positive impact on trust in streamers, and streamer-product matching has a positive moderating effect on the relationship between streamers' reputation, streamers' popularity, and trust in streamers. Online reviews have a positive moderating effect on the relationship between streamers' popularity and trust, while online shopping experience has a positive moderating effect on the relationship between streamers' reputation and trust in streamers.

Keywords: live streaming shopping; streamer; streamer-product matching; online reviews; online shopping experience; trust in streamers

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1 Introduction

As a subfield of e-commerce, live streaming shopping uses social live streaming websites for real-time interaction to obtain an immersive shopping experience[1−3]. Live streaming shopping has expanded rapidly in the past few years, and it is well known and accepted by an increasing number of consumers. According to data from iiMedia Research, the market scale of China's live streaming e-commerce in 2017 was only ￥19 billion, but by 2020, it had reached nearly ￥one trillion. Many consumers have also recognized and preferred some specific streamers, such as Jiaqi Li, whose sales on the first day of Double 11 pre-sale in 2020 were ￥5.32 billion. The rapid expansion of live streaming shopping cannot disguise the fact that excellent and bad streamers are intermingled, which leads to frequent "rollover" events including famous streamers. These events may damage the reputation of streamers and seriously hurt consumers' trust in them, which hinders the healthy development of the whole business.

Existing literature on live streaming shopping has mainly focused on consumers' purchase intention[4−8]. Research on purchase intention examines two main aspects: On the one hand, it addresses the live streaming scene atmosphere, showing that interactivity, authenticity, entertainment, and presence can arouse consumers' pleasant feelings and improve their purchase intentions[9, 10]. The usefulness and reliability of live streaming information can enhance perceived value to

promote purchase intention[10], which can be directly enhanced by utilitarianism and hedonism[4, 5, 8]. On the other hand, it emphasizes the streamers' characteristics, showing that their professionalism, interaction, and attraction can affect consumers' attitudes and their purchase intention[6, 7, 11]. A streamer's sense of social presence can also affect consumers' purchase intentions[12]. However, live streaming shopping differs from traditional e-commerce, and the key to the success of live streaming shopping lies in the streamer. The streamer can profit more only if it obtains consumers' trust in the form of significant live streaming traffic[13]. In addition, there are differences between live streaming shopping and traditional e-commerce[5, 13, 14]. First, the two have different methods of information interaction: Traditional e-commerce mainly transmits information in the form of pictures and words, which is single and challenging to attract consumers, while live streaming shopping is a live commentary by the streamer, which comprehensively displays product information to consumers through live streaming. Second, the direction of the information interaction is different. Traditional e-commerce focuses on the one-way information interaction mode of consumers viewing product information. The information exchange direction for live streaming shopping is two-way as consumers communicate with the streamer in real-time through the bullet screen, and the streamer also answers the questions raised by consumers in real-time, which greatly improves their sense of experience. Third, the subjective and

objective characteristics of information interaction differ. The information interaction mode of traditional e-commerce has strong objectivity, and consumers' purchase behavior depends on the satisfaction of product information with consumers' needs. The information interaction mode of live streaming shopping has a stronger subjective color as consumers choose streamers based on their personal preferences. The streamer also recommends products according to their preferences and understanding of them. The above summary suggests that previous studies hoped to find an effective way to improve purchase intention in live streaming shopping through its study, however, they have not pay attention to an essential difference between live streaming shopping and traditional e-commerce, that is, the streamer is the key to the success of the former as they can develop for a long time by gaining consumers' increasing trust and preference and thus more traffic[13]. In practice, some streamers such as Jiaqi Li are preferred and trusted by an increasing number of consumers; therefore, this study focuses on trust in streamers to explain why this happens.

Jeun believes that trust is a prerequisite for collaboration and coordination to achieve more interest exchange and that it is an essential factor affecting live streaming purchase behavior[15−17]. Existing studies have only examined trust as a whole, but in actual transaction activities, agents (sellers, salespeople, website platforms, etc.), products, and companies all involve consumer trust[18]. Among these entities, consumers' trust in a seller is vital as it determines the occurrence of follow-up behavior, which can reduce consumers' fear of transaction failure and their perceived uncertainty about the seller's opportunistic behavior[16, 19−21]. Throughout the live streaming process, the streamer dominates live streaming activities and is responsible for product sales in the live streaming room. Their characteristics may also affect consumers' trust; therefore, it is necessary to study the impact of these characteristics on trust in streamers. In this study, trust in streamers refers to consumers' trust in them. In the live streaming shopping environment, reputation and popularity, as part of the streamer's characteristics, represent consumers' recognition and evaluation of the streamer to a certain extent[22]. To reduce perceived uncertainty, consumers usually choose streamers with a good reputation and high popularity; to maintain their reputation and popularity, these will be more responsible for their remarks and are more likely to provide real and reliable information to gain the trust of more consumers. These streamers are often more popular and preferred by consumers, as in the case of Jiaqi Li; therefore, this study discusses the impact of streamers' reputation and popularity on trust in streamers.

Many consumers perceive live contents as more trustworthy than traditional commercial strategies[23]. When faced with many streamers to choose from, consumers usually choose streamers with a good reputation or high popularity, evaluate the quality of reviews in live streaming and measure the matching degree between the streamer and the product or brand image[8]. Positive reviews and good streamer-product matching meet their positive expectations for the streamer image, which is likely to strengthen the impact of reputation and popularity on trust in streamers–even in unfamiliar ones[24]. On the contrary, when consumers come across many

negative reviews or realize that the streamer does not match the product, they are likely to think that the streamer is merely a marketer pursuing profit; they may think that the streamer's good reputation and high popularity are untrue[8], thus weakening the impact of reputation and popularity on trust in streamers. Therefore, it is necessary to study the moderating effect of streamer-product matching and online reviews on streamers' characteristics and trust in streamers. As live streaming shopping is an emerging business model, many people's live streaming shopping experience is not particularly rich; thus, consumers' past online shopping experience may affect their choice of streamer. In traditional e-commerce research, online shopping experience has been proven to be effective as a moderating variable[25−28], and in research on live streaming shopping, it has not been tested. Therefore, this study selects online shopping experience as a moderating variable to test whether it is effective in the live streaming shopping environment.

This study attempts to enrich the research on live streaming shopping from streamers' characteristics and trust in streamers. It explores whether streamers' reputation and popularity impact trust in streamers and introduces three moderating variables: streamer-product matching, online reviews, and online shopping experience from the live streaming scenario and consumer characteristics. This study attempts to explain why more consumers prefer specific streamers, such as Jiaqi Li, to compensate for the lack of relevant research. Moreover, it provides relevant suggestions for the healthy development of live streaming shopping and provides suggestions on how to attract more consumers.

2 Literature review and hypothesis development

2.1 Live streaming shopping

Live streaming shopping is a business model that sells goods to consumers through live streaming on e-commerce or social platforms. Currently, two main types of live streaming shopping exist: the first embeds live streaming shopping into e-commerce platforms such as Taobao and Jingdong, using it as a product recommendation and with the streamer showing products. The other integrates e-commerce into live streaming platforms or short video Apps such as TikTok, Jitter, and Lives.me[5]. This research mainly takes the first form of live streaming shopping as the research object because it has a more extensive user base and a more comprehensive range of influence and many well-known streamers are live streaming through e-commerce platforms.

At present, the research on live streaming shopping mainly focuses on the motivation and purchase intention of watching live streaming shopping. Some researchers have also discussed the current situation of the live streaming shopping industry from a macro perspective, indicating that comsumers have two main motives for watching live streaming shopping: utilitarianism (for buying products) and hedonism (for interacting with favorite streamers)[5]. The important factors affecting consumers' tendency to watch live streaming shopping are social function, user characteristics, streamers' characteristics, responsiveness, and personalization[7, 22, 29]. Shared experience

and perceived efficacy positively impact consumers' hedonic behavior[30]. Vividness, interactivity, authenticity, presence, value compatibility, and good product displays can enhance consumers' purchase intention[9, 10, 31]. The entertainment, security, and sociality of live streaming platforms can affect consumers' perceived value and risk, affecting their purchase intention[10]. The professionalism, interactivity, and attractiveness of streamers can affect consumer attitudes and purchase intentions[6,7, 11]. From a macro perspective, Cheng et al. established a causal relationship model between live streaming and commodity sales by quantitative methods showing that compared with those who do not adopt live streaming, merchant product sales volume has increased by 21.8%, and the conversion rate has significantly improved[32]. Other studies have analyzed the mode of Taobao live, summarized the advantages of live streaming shopping, and suggested promoting the combination of live streaming and e-commerce[3, 4, 33].

In summary, previous studies have focused on consumers' purchase intentions. However, it is difficult to explain the actual phenomenon of why more consumers prefer specific streamers, such as Jiaqi Li, by only studying purchase intention. Therefore, by considering the influence of streamers' characteristics and trust in streamers, we aim to better understand this phenomenon.

2.2 Trust

Trust is an essential factor that affects consumers' live streaming shopping. Consumers and sellers are spatially separated in a network environment. When consumers have a sense of trust in the sellers, they can buy products[15, 16, 18]. Trust can promote interactions between buyers and sellers in any type of e-commerce[34], and it is a significant factor in promoting transactions, which can enhance consumers' positive feelings about the seller and improve perceived revenue and purchase intention[35, 36]. Trust can also maintain and strengthen consumer loyalty, which is critical for improving user stickiness[37]. Lack of trust is also an important reason for transaction failures as consumers' perceived uncertainty makes transactions difficult, especially for first-time buyers[38, 39]. Research has shown that reputation and popularity are important pre-factors that impact trust in the traditional e-commerce environment. Reputation reflects the seller's ability and integrity, and the seller's reputation positively impacts consumers' trust in the seller[40, 41]. Particularly, when consumers lack relevant purchase experience, it is necessary to measure whether the seller is trustworthy by evaluating other consumers[42]. High-popularity sellers are more likely to be reliable sources of information and can provide high-quality information[43]; the higher the quality of the information provided by the seller, the more thoroughly users will understand the information content and the higher the trust in the seller[44]. Zolfagha and Aghaie believe that high-quality information can help the information receiver rationally investigate the credibility and reliability of the object, thus promoting the formation of cognitive trust[45].

2.3 Streamer and opinion leader

In this study, a streamer delivers product information to consumers through a webcast on an e-commerce platform to achieve product promotion and sales. According to the literature, e-commerce streamers are divided into three main categories[12, 46, 47]: ① traditional offline opinion leaders or social celebrities with strong fan appeal and social marketing ability, such as Jun Lei (Founder, Chairman, CEO of Xiaomi Corporation), who can fully mobilize consumers' enthusiasm for participation; ② online opinion leaders or Internet celebrities with high popularity and a good reputation, such as Jiaqi Li and Yonghao Luo, who can quickly make consumers trust them; and ③ online store owners. Many such streamers need to have sufficient knowledge in the professional field because, according to innovation diffusion theory, it is difficult for both parties with the same cognition to exchange information effectively. Streamers need a higher level of cognition than consumers to carry out direct shopping activities effectively; therefore, they can also be regarded as opinion leaders in a specific field[47,48]. It is evident that although streamers cannot be entirely equal to opinion leaders, for example, some streamers have less influence than opinion leaders, and the conditions for becoming streamers are relatively low[49]. However, in addition to the streamers of online or offline opinion leaders, other streamers also play the role of opinion leaders in the live streaming room by mastering rich information. In summary, we can learn to study streamers from the research results on opinion leaders.

Opinion leaders have a good reputation and a high profile for offline shopping. They can continuously involve themselves in their professional fields, form their own opinions, provide consumers with highly professional information and impact their attitudes through word-of-mouth information dissemination. For consumers, the recommendation of opinion leaders is more convincing than that of other marketing methods[50, 51]. Unlike offline shopping, consumers have a higher perceived risk in the Internet environment: if opinion leaders give positive suggestions, this will significantly reduce the uncertainty of perception and improve consumers' trust[52, 53]. Opinion leaders can play such a significant role because they have a good reputation and are highly popular. Compared to ordinary people, they have a higher degree of professional involvement and product familiarity. Further, they are more willing to obtain more professional information from a variety of channels and pass the information to consumers through professional means and reliable channels, which fully enhances consumers' trust in opinion leaders[54−57]. In addition to the advantages of traditional opinion leaders, in the circumstances of live streaming shopping, the streamer not only reduces the perceived risk of virtual shopping but also significantly shortens the distance with consumers and plays a greater role in word-of-mouth communication through the comprehensive display of goods and real-time interaction with consumers. The streamer's excellent reputation and high popularity can eliminate consumers' perceived uncertainty to a greater extent and enhance trust in the streamer.

In conclusion, streamers with a good reputation and popularity have a strong influence, playing the role of opinion leaders when transmitting information so that the information receiver can recognize the effectiveness of the information more. Consumers believe that streamers are reliable sources of information. Conversely, streamers will understand more

comprehensive product information and be more responsible for their remarks and recommended product information to maintain reputation and popularity; they provide more authentic and reliable product information, eliminate consumers' perceived uncertainty and increase consumers' trust in the streamer. Therefore, the following hypotheses are proposed:

H1: Streamers' reputation has a positive impact on trust in streamers.

H2: Streamers' popularity has a positive impact on trust in streamers.

2.4 Streamer-product matching

Streamer-product matching refers to the matching degree between the streamer's image and the product image features recommended and endorsed by the streamer[58]. The matching theory was originally proposed by Kamins, who holds that "the consistency between celebrities and products determines the effectiveness of advertising. The higher the matching degree between them, the more effective the advertising will be"[59]. This theory has been verified by relevant research demonstrating the importance of matching celebrities and products, with a high degree matching significantly improving the attraction and credibility of celebrities[58, 60, 61]. Peterson and Kerin found that celebrities adjust their clothes according to the endorsed product type, and the two must match. For example, when endorsing ice cream, celebrities ought not to wear cotton-padded jackets[62]. Kamins and Gupta explored the matching degree of advertising elements and found that when the image of a celebrity is consistent with that of the product, consumers attribute higher credibility and attraction to the celebrity; further, the match provides a better sense of trust and a better advertising effect[63]. Sengupta et al. found that the higher the matching degree between celebrities and product image, the more positive the consumers' attitudes toward products[64]; for example, sports-related products are recognized by athletes[65], or attractive products are recognized by attractive stars[59]. However, most research focuses on the influence of celebrity and product matching on advertising effectiveness, such as product attitude, advertising attitude and purchase intention[8, 23].

When a celebrity's lousy product matching case is reported, their product matching degree is low, and their credibility and attractiveness are negatively affected[58]. When the brand personality is greater than that of celebrities themselves, it will affect the celebrity's personality. Celebrity personality then merges with brand personality[66]. However, most streamers are not as famous as traditional celebrities, and they should pay more attention to their matching degree, products, and the impact.

Celebrities shape their image and personality through social media, and they can give a deeper meaning to their products through endorsement or product promotion. Their recognized products also create the image meaning they represent[67, 68]. When the streamer-product matching degree is high, the streamer's image and the product's identity fit as a streamer's image gives the product a deep meaning. In turn, the product's identity deepens the streamer's image and enhances their reputation and popularity as a credible source. When the streamer-product matching degree is low, the

product's image recommended by the streamer is not consistent with that created by the product itself. The image range created by the streamer is narrower than that of the traditional celebrity, breaking the consumers' long-standing cognition of the streamer's image and shaking the meaning of such image. This can weaken the positive influence of the reputation and popularity of the streamer regarding their own credibility. Therefore, the following hypotheses are proposed:

H3: Streamer-product matching positively moderates the effect of streamers' reputation on trust in streamers.

H4: Streamer-product matching positively moderates the effect of streamers' popularity on trust in streamers.

2.5 Online reviews

In this study, we define online reviews in live streaming shopping as the positive or negative reviews received by consumers about streamers or recommended products[69]. The potential buyer's trust in the seller is affected primarily by the previous buyer's feedback: the better the seller's evaluation, the better the potential buyer's impression of the seller's integrity; in contrast, the worse the seller's evaluation, the higher the probability of dishonesty, and the more likely potential consumers are to form an impression of dishonesty regarding the seller[70, 71]. In consumer behavior, the extremes of reviews can affect consumers' attitudes and perceived value and moderate the relationship between consumers' attitudes, perceived value and purchase intention[72−74]. Positive reviews strengthen consumers' interest in products, thus enhancing their recognition of products or their purchase intention[75]. Positive reviews can significantly moderate the relationship between perceived usefulness and purchase intention and positively moderate the relationship between brand image and perceived value[74, 76]. Consumers produce a "negative bias" effect when dealing with product information. The negative impact of negative information is greater than the positive impact of positive information[77−80] as negative reviews weaken the positive impact of consumer trust on product purchase intention and significantly reduce the number of products sold[71]. Moreover, negative reviews can moderate the relationship between product popularity and product sales and weaken the positive impact of the former on the latter[81]. However, a small number of negative reviews do not affect consumers' perception of product defects, which increases the authenticity and credibility of the overall reviews[82].

Research has found that the number and length of positive reviews moderate consumers' attitudes toward products or sellers to a certain extent and enhance consumers' trust in products or sellers[80, 83−88]. When a product has many positive reviews, it is more likely to receive greater attention from potential consumers[85]. Under the influence of herd mentality and risk aversion awareness, these consumers tend to buy products purchased by most people at low transaction costs[83]. Conversely, the number of positive reviews will attract greater attention, and consumers will consider the reviews are more persuasive, thus strengthening their trust in the seller[88]. The length of reviews reflects the richness of information: the longer the reviews are, the more consumers pay attention to them. It stimulates consumers' interest in reading reviews and even changes their attitudes toward products[80, 87]. Longer pos-

itive reviews can strengthen consumers' positive attitudes toward sellers or products to enhance their trust in them. Because the interaction between streamer and consumer is more frequent in live streaming, the number and length of reviews will increase. We believe that online reviews still play a moderating role in live streaming shopping. In a live streaming shopping environment, when the streamer interacts with consumers or recommends products, many consumers post reviews on the streamer or products in the form of a barrage, which may be positive or negative. More or longer positive reviews make consumers believe that the streamers' reputation and popularity are true, enhancing the positive impact of streamers' reputation and popularity on trust in streamers. On the contrary, too many negative reviews destroy the streamers' image, makes consumers doubt the authenticity of their reputation and popularity and weakens the positive impact of streamers' reputation and popularity on trust in streamers.

Existing research suggests that positive online reviews will strengthen streamers' reputation and popularity, which will encourage consumers to form positive psychological expectations for the streamers and reduce perceived uncertainty. This can enhance consumer recognition and trust in streamers. In contrast, a negative online review is more likely to attract consumers' attention. It destroys the personality characteristics that streamers have shaped for a long time to weaken the positive impact of their reputation and popularity on trust in streamers. Thus, we postulate the following:

H5: Online reviews positively moderate the effect of streamers' reputation on trust in streamers.

H6: Online reviews positively moderate the effect of streamers' popularity on trust in streamers.

2.6 Online shopping experience

In the online shopping environment, consumers evaluate their online shopping experience in terms of product information, payment method, delivery date, service, risk, privacy, navigation, entertainment and enjoyment[89, 90]. Consumers' purchase decisions largely depend on experience quality, which can only be obtained through purchases. This shows that past shopping experiences greatly interfere with future online shopping decision-making behavior, and online shopping experience restricts consumers' online shopping behavior[91−93]. Online shopping experience reflects consumers' familiarity with online shopping: the more experience online shopping consumers have, the stronger their search ability for relevant products and sellers. Therefore, they can quickly screen information to improve their adaptability to new types of online shopping activities, which improves their purchasing decision-making abilities[28]. Research shows that consumers with a more satisfying online shopping experience are more confident and willing to interact with online shopping service providers[94, 95]. Some researchers divided online shopping experiences into direct and indirect, finding that both significantly moderate consumers' online shopping decisions[28]. In addition, many studies have proven that online shopping experience can significantly moderate the relationship among perceived value, trust, satisfaction and purchase willingness in an online shopping environment[25−27]; therefore, online shopping experiences can moderate consumers' attitude change during shopping[96].

In summary, in the online shopping environment, online shopping experience as a moderating variable has been verified as effective by many researchers. However, there is a lack of research on the new social e-commerce model of live streaming shopping as a moderating variable; therefore, we consider online shopping experience as a moderator of the relationship between streamers' characteristics and trust in streamers. We argue that when consumers have a rich experience in online shopping, they can quickly screen out all kinds of valuable information so that they have a strong sense of adaptation to live streaming shopping; thus, they are more willing to interact with the streamers, deepening their understanding of the streamers' reputation and popularity and enhancing their trust in streamers. On the contrary, when online shopping experience is not rich, it cannot effectively screen all kinds of information and has a strong sense of inadaptability to live streaming shopping. Thus, consumers are more likely to be skeptical of streamers' reputation and popularity, which weakens this positive impact. Therefore, we postulate

H7: Online shopping experience positively moderates the effect of streamers' reputation on trust in streamers.

H8: Online shopping experience positively moderates the effect of streamers' popularity on trust in streamers.

2.7 Research model

Fig.1 draws on the above to present a theoretical framework of the impact of streamers' reputation and streamers' popularity on trust in streamers. Streamer-product matching, online reviews and online shopping experience as moderator variables moderate the relationship between streamers' reputation, streamers' popularity and trust in streamers.

3 Methodology and sample

The questionnaire includes rating scales to capture the study's main variables: streamers' reputation, streamers' popularity, streamer-product matching, online reviews, online shopping experience, and trust in streamers, using a seven-point Likert scale ranging from (1) "strongly disagree" to (7) "strongly agree."

To ensure the questionnaire's content validity, maturity scales studied at home and abroad were adopted as questionnaire scales. All measurement items were pre-tested and ad-
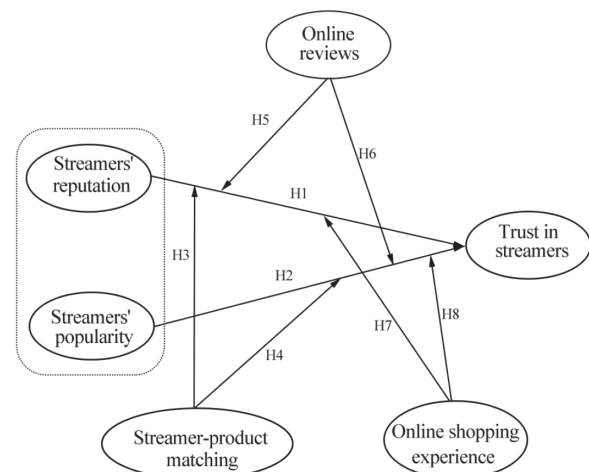

Fig. 1. Conceptual model.

justed to fit the context of live streaming shopping. A three-item measure of streamers' reputation was adapted from Koufaris and Hampton-Sosa[97]. A three-item measure of streamers' popularity was adapted from Meng[11], and a three-item measure of streamer-product matching was adapted from Balasubramanian[98]. Moreover, a three-item measure of online reviews was adapted from Park[99], a three-item measure of the online shopping experience was adapted from Limayem and Hirt[100], and a three-item measure of the trust in streamer was adapted from Ba and Pavlou[70], Kim and Park[1]. Then, we conducted a pre-test, and collected 61 valid questionnaires. The pre-test results showed that the measurement items were valid (see Table 1).

The respondents of this study were consumers who had seen or experienced live streaming shopping. This study adopted the questionnaire survey method, which was distributed in the form of an online questionnaire in the Yangtze River Delta of China. A total of 407 questionnaires were collected; respondents who had not had live streaming shopping experiences or filled in the screening questions incorrectly were excluded; of the questionnaires collected, 93 were invalid, and 314 were valid, with an effective rate of 77.15%.

Of the 314 respondents, 52.9% (n=166) were women, and 47.1% (n=148) were men. The respondents' age groups ranged from under 20 years of age (0.6%) to 20–25 years (45.9%), 26–35 years (28%), 36–45 years (21%), and over 45 years (4.5%); thus, their age was mainly between 25 and 45, which is in line with that of the main consumer groups in today's society. The number of online shopping visits in the month was mainly below seven (73.2%, n=230). In addition, some respondents reported 12 or more online shopping times per month (17.8%, n=56). The live streaming shopping platforms used by the respondents were mainly Taobao (51.6%, n=162) and TikTok (21.7%, n=68).

4 Results

4.1 Measurement model estimation

AMOS 24 was used for structural equation modeling (SEM). The main constructs were evaluated for reliability, convergence, and discriminant validity before testing the structural model. We evaluated the validity of the measured constructs by conducting confirmatory factor analysis (CFA), and the goodness-of-fit statistics verified that most criteria met the recommended values in the measurement model (χ^2/df= 2.431<3, RMSEA=0.068<0.08, p<0.001, CFI=0.965, GFI= 0.911, RMR=0.080, NFI=0.942, RFI=0.926); hence, the measurement model fit the data well. According to the reliability and validity analysis of the model, Table 2 shows that the Cronbach's alpha of each item in the questionnaire is above 0.8, the factor load of each item is greater than 0.5, and the variable convergence validity is good. Composite reliability (CR) was high, above 0.8[101]. Further, we tested discriminant validity by model comparison[102, 103]. Table 3 shows the fit stat-

istics for all models. The fitting effect of the six-factor model is better than that of the other models, indicating good discriminant validity.

We checked the variance inflation factor (VIF) to confirm multicollinearity. The VIF values ranged from 1.016 to 2.796, which are considerably lower than the value 10 suggested by Hair et al.[104].

4.2 Hypotheses testing

AMOS was used to test the hypotheses. When testing the moderating effect, the measurement item of the interaction item was to rank the standardized factor load of the independent variable and the moderating variable from high to low and match them according to the principle of "large with large, small with small", then multiplying them by standardization[105–107].

First, a path test was conducted on the independent variable of streamers' reputation and the moderating variables of streamer-product matching, online review, and online shopping experience. The results are presented in Table 4 (the described coefficient is the standardized path coefficient, β value). The table shows that streamers' reputation has a significant positive impact on trust in streamers in the three models, supporting H1. In Model 1, the interaction term coefficient between streamers' reputation and streamer-product matching is 0.092, $p < 0.05$, which indicates that streamer-product matching positively moderates the relationship between streamers' reputation and trust in streamers, supporting H3. In Model 2, the interaction term coefficient between streamers' reputation and online review is 0.038, $p > 0.05$, which indicates that online reviews do not positively moderate the relationship between streamers' reputation and trust in streamers; thus, H5 is not supported. In Model 3, the interaction term coefficient between streamers' reputation and online shopping experience is 0.095, $p < 0.05$, which indicates that online shopping experience positively moderates the relationship between streamers' reputation and trust in streamers, thus supporting H7.

Next, a path test was conducted on the independent variable of streamers' popularity and the moderating variables of streamer-product matching, online review, and online shopping experience, and the results are shown in Table 5. The table shows that streamers' popularity has a significant positive impact on trust in streamers in the three models, supporting H2. In Model 4, the interaction term coefficient between streamers' popularity and streamer-product matching is 0.095, $p < 0.05$, indicating that streamer-product matching positively moderates the relationship between streamers' popularity and trust in streamers, supporting H4. In Model 5, the interaction term coefficient between streamers' popularity and online reviews is 0.091, $p < 0.05$, which indicates that online reviews positively moderate the relationship between streamers' popularity and trust in streamers, supporting H6. In Model 6, the interaction term coefficient between streamers' popularity and online shopping experience is –0.041, $p > 0.05$, indicating that online shopping experience positively

Table 1. Fit statistics for models of pretest.

Model	RMSEA	χ^2/df	RMR	NFI	RFI	CFI	GFI
SR, SP, PM, OR, OS, TS	0.066	2.364	0.080	0.943	0.928	0.966	0.912

Table 2. Reliability and convergent validity.

Variables		Factor loading	CR	AVE	Cronbach's alpha
Streamers' reputation	SR1	0.875			
	SR2	0.858	0.913	0.777	0.912
	SR3	0.911			
Streamers' popularity	SP1	0.949			
	SP2	0.876	0.944	0.848	0.943
	SP3	0.936			
Streamer-product matching	PM1	0.914			
	PM2	0.968	0.938	0.834	0.936
	PM3	0.854			
Online review	OR1	0.664			
	OR2	0.840	0.820	0.606	0.814
	OR3	0.819			
Online shopping experience	OS1	0.675			
	OS2	0.790	0.857	0.670	0.866
	OS3	0.965			
Trust in streamers	TS1	0.942			
	TS2	0.930	0.923	0.801	0.919
	TS3	0.807			

Table 3. Fit statistics for models: discriminant validity.

Model	RMSEA	χ^2/df	RMR	NFI	RFI	CFI	GFI
SR, SP, PM, OR, OS, TS (six-factor model)	0.068	2.431	0.080	0.942	0.926	0.965	0.911
SR+SP, PM, OR, OS, TS	0.102	4.231	0.110	0.895	0.871	0.917	0.806
SR+SP+PM, OR, OS, TS	0.175	10.638	0.312	0.726	0.675	0.744	0.680
SR+SP+PM+OR, OS, TS	0.188	12.014	0.316	0.684	0.633	0.701	0.643
SR+SP+PM+OR+OS, TS	0.210	14.817	0.354	0.604	0.548	0.619	0.593
SR+SP+PM+OR+OS+TS	0.227	17.173	0.356	0.538	0.476	0.551	0.545
SR, SP+PM, OR, OS, TS	0.161	9.087	0.302	0.773	0.723	0.792	0.752
SR, SP+PM+OR, OS, TS	0.177	10.755	0.317	0.723	0.672	0.741	0.698
SR, SP+PM+OR+OS, TS	0.201	13.680	0.359	0.640	0.582	0.656	0.636
SR, SP+PM+OR+OS+TS	0.224	16.638	0.355	0.555	0.492	0.569	0.548
SR, SP, PM+OR, OS, TS	0.134	6.624	0.361	0.835	0.798	0.855	0.763
SR, SP, PM+OR+OS, TS	0.172	10.288	0.468	0.735	0.686	0.753	0.665
SR, SP, PM+OR+OS+TS	0.193	12.698	0.349	0.666	0.612	0.682	0.660
SR, SP, PM, OR+OS, TS	0.125	5.866	0.194	0.854	0.821	0.875	0.796
SR, SP, PM, OR+OS+TS	0.132	6.457	0.193	0.834	0.803	0.855	0.780
SR, SP, PM, OR, OS+TS	0.121	5.586	0.185	0.861	0.829	0.882	0.809

moderates the relationship between streamers' popularity and trust in streamers; thus, H8 is not supported.

5 Discussion

5.1 Conclusion

This study provides evidence of the impact of streamers' reputation and popularity on trust in streamers. This study focuses on product matching, online reviews, and online shopping experience to understand their role in the relationship between streamers' reputation, streamers' popularity, and trust in streamers.

First, live streaming shopping perfectly solves the "it cannot see the actual product" pain point of traditional e-commerce. A streamer with a good reputation endorses the product while introducing it smoothly and comprehensively[8]

Table 4. Results of path analysis for streamers' reputation, streamer-product matching, online reviews and online shopping experience.

	Path			Unstandardized coefficients	Standardization coefficients	S.E.	C.R.	*p*
	SR	→	TS	0.751	0.778	0.049	15.376	***
Model 1	PM	→	TS	0.015	0.019	0.032	0.463	0.643
	SRXPM	→	TS	0.047	0.092	0.021	2.178	0.029
	SR	→	TS	0.484	0.499	0.057	8.410	***
Model 2	OR	→	TS	0.636	0.408	0.101	6.302	***
	SRXOR	→	TS	0.023	0.038	0.025	0.919	0.358
	SR	→	TS	0.744	0.770	0.053	13.970	***
Model 3	OS	→	TS	0.138	0.109	0.058	2.358	0.018
	SRXOS	→	TS	0.048	0.095	0.023	2.132	0.033

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

Table 5. Results of path analysis for streamers' popularity, streamer-product matching, online reviews and online shopping experience.

	Path			Unstandardized coefficients	Standardization coefficients	S.E.	C.R.	*p*
	SP	→	TS	0.531	0.670	0.039	13.724	***
Model 4	PM	→	TS	0.007	0.009	0.037	0.190	0.849
	SPXPM	→	TS	0.044	0.095	0.022	2.016	0.044
	SP	→	TS	0.258	0.324	0.043	5.974	***
Model 5	OR	→	TS	0.842	0.543	0.102	8.242	***
	SPXOR	→	TS	0.040	0.091	0.017	2.363	0.018
	SP	→	TS	0.478	0.604	0.04	11.992	***
Model 6	OS	→	TS	0.236	0.184	0.064	3.684	***
	SPXOS	→	TS	−0.020	−0.041	0.024	−0.841	0.400

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

and reducing their vigilance against strangers. Consumers are more willing to listen to the streamer's explanation and introduction of the product and his personal views on it, which enhances their trust in the streamer. Highly popular streamers are generally stars, online celebrities, and so on[47], and they have a large number of fans who interact with them in live streaming; this mobilizes the enthusiasm of consumers to participate, giving them pleasure[49] and increasing the consumers' trust in the streamer. This also explains why more consumers prefer some specific streamers: they have a good reputation and popularity, and it is easier to win the trust and favor of consumers.

Second, the higher the streamer-product matching, the more positive the impact of streamers' reputation and popularity on trust in streamers. When the streamer-product matching is higher, consumers will consider the streamer as being more knowledgeable in this field and knowing the product well, which enhances their attractiveness and credibility[60, 61]. To maintain reputation and popularity, the streamer chooses products that match their image for the recommendation. They provide more reliable information, which gives consumers a sense of trust in the streamer and strengthens their image[68], enhancing the positive relationship between streamers' reputation, popularity, and trust in streamers.

Third, online reviews have no moderating effect on the relationship between reputation and trust, but they have a moderating effect on the relationship between popularity and trust.

In live streaming shopping, consumers may pay attention to reviews; however, online reviews will not affect consumers' trust in streamers with a good reputation because reputation represents consumers' recognition and evaluation of the streamers[40]. To maintain their reputation, streamers pay special attention to their remarks, and consumers' reviews of these streamers are also positive. Many consumers naturally have a sense of trust in a reputable streamer rather than pay more attention to reviews in live streaming. This leads to many viewers in the streamers' live streaming room, resulting in the phenomenon of "reviews bombarding the screen" and less consumers reading them.

Fourth, interestingly, the moderating effect of online shopping experience is opposite to that of online reviews. Online shopping experience has a moderating effect on the relationship between streamers' reputation and trust in streamers; however, it has no moderating effect on the relationship between popularity and trust in streamers. Online shopping experiences are formed by consumers in long-term online shopping[90], which includes consumers' recognition and trust in some popularity streamers. Experienced online shopping consumers rely on their own experience to choose trusted streamers, paying attention to experiencing the fun brought by the live streaming shopping process rather than focusing on the streamers' popularity. This shows that the influence of popularity on trust in streamers is fixed. Consumers' online shopping experience affects their preference for streamers,

but it cannot moderate the influence of popularity on trust in streamers.

5.2 Theoretical contribution

First, this study enriches the results of research on live streaming shopping and especially on trust in streamers. From this perspective, this study explains the observed phenomenon of why more consumers prefer specific streamers, such as in the case of Jiaqi Li. It reveals that compared with previous research on purchase intention, research on trust in streamers is equally important[5, 6]. Streamers can only gain more consumer trust and preference to obtain more traffic for long-term development. This study found that consumers prefer streamers with a good reputation or high popularity as these have higher credibility and consumers are more likely to trust them, which is also consistent with the actual situation.

Second, this study focuses on the moderating effect of streamer-product matching on the relationship between streamers' reputation, popularity, and trust in streamers. The results show that matching theory is still effective in a live streaming shopping environment[59]. In previous studies, the matching of celebrities and products helped to enhance the advertising effect and celebrity attraction[63, 64]. In this study, we apply matching theory to the live streaming shopping environment and expand the research on celebrities to streamers. Testing the moderating effect of streamer-product matching on trust in streamers enriches the research content of matching theory and provides a new research perspective.

Third, this study found that online reviews and shopping experience have different moderating effects on trust in streamers, revealing their limitations in moderating such trust. In the study of traditional e-commerce, online reviews and shopping experience have been proven to be effective moderator variables[25, 28, 83, 85, 96]; however, in a live streaming shopping environment, online reviews and shopping experience are only partially effective in moderating trust in streamers. This study compensates for the lack of online reviews and online shopping experience in the relevant research on live streaming shopping and reflects the differences between traditional e-commerce and live streaming shopping.

5.3 Managerial implication

Based on our findings, we make the following management and marketing suggestions.

Whether online or offline, streamers should pay attention to maintaining and promoting their reputation and popularity. Online, streamers should interact actively with fans in various ways, such as through Weibo and TikTok. When consumers encounter problems with a product, they should actively communicate with streamers and strive to find solutions to problems to achieve satisfaction. Streamers may also conduct public welfare live streaming activities and be streamers with a sense of social responsibility. Offline, streamers should actively communicate with manufacturers and then try and experience the relevant products to ensure that they are familiar with the quality and function of the products before recommending them to consumers to become high-quality e-commerce streamers. They should shape their image in various ways, strengthening their image through live streaming shopping. In addition, streamers should also strengthen their

professional knowledge, actively pay attention to the latest professional field developments and let their professional explanations convince consumers. Moreover, when selecting the recommended products, streamers should consider products with high matching degrees with their image and avoid those with low matching degrees.

Streamers should pay more attention to the online reviews released by consumers during live streaming and to the value needs of users. Moreover, they should display products and services in the form of creativity and entertainment to enhance attraction and interest in live streaming. They should encourage consumers to actively publish and share positive content in a live streaming room as this can provide timely feedback and answers to the questions raised by consumers to enhance their emotional experiences and make them feel close to the streamers.

Based on consumers' different online shopping experiences, the live streaming room's design style and streamers' interactive communication style should be different. For consumers with rich online shopping experience, streamers should pay more attention to the comprehensive and detailed introduction of product information. They should compare the recommended products with similar products more truly and concretely, making consumers with rich online shopping experiences feel their sincerity and quickly generating a sense of trust in them. For consumers who are not experienced in online shopping, streamers should follow a more attractive style in a live streaming room. In the process of live streaming, streamers should pay more attention to interactions to fully mobilize the consumers' enthusiasm and integrate them into the live streaming environment. They should directly tell consumers that the product has a higher cost performance and make them aware of the benefits of buying the product. They can also create a live streaming atmosphere of "such an opportunity, once missed, will be forever gone," so that the consumers develop a great interest in products in a short period, fully stimulating their desire to buy.

5.4 Limitations and future research

First, in the sample selection process, due to the limitations of research cost and time, our samples are mainly from the Yangtze River Delta, mainly young people. The follow-up research can expand the sample and cover more regions and age groups so that the sample distribution is more uniform, further improving the external validity of the research results.

Second, this study focused only on the two personal characteristics of streamers: reputation and popularity. Future research should pay more attention to other aspects, such as professional ability and product involvement. Moreover, it could explore the impact of streamers' characteristics on perceived trust from more perspectives.

Third, this study only examined the influencing factors of trust in streamers in the context of live streaming shopping. As consumers have the perception of trust of streamers as well as in the product and platform, follow-up research may focus on perceived trust in the product and platform.

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Conflict of interest

The authors declare that they have no conflict of interest.

Biographies

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