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The effect of live-streaming shopping on the consumer's perceived risk and purchase intention in China

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Abstract

Recent empirical research has indicated that the perceived risk in e-commerce affects the consumer's purchase intention. Based on the Stimulus-Organism-Response (SOR) model, this study explores the effects of environmental stimuli on the consumer's perceived risk and purchase intention within a live-streaming shopping context. Through a sample of 341 valid users, we found that 1) perceived risk has a negative effect on the consumer's purchase intention; 2) the streamer's credibility partially mediates the relationship between perceived risk and purchase intention; and 3) the interactivity is positively associated with purchase intention. These results provide possible insights into how environmental stimuli in the context of live-streaming shopping affect the consumer's perceived risk and purchase intention.

Keywords: live streaming; perceived risk; purchase intention; credibility; media richness

Introduction

Live streaming has transformed the way in which online business is conducted. Live-streaming shopping has witnessed explosive growth in China. According to CNNIC (2020), the number of online shopping users has reached 710 million, accounting for nearly 80 percent (78.6%) of total internet users, while the number of live-streaming shopping users has reached 265 million, accounting for nearly 40 percent (37.2 %) of total online shopping users. It shows the crucial role played by live-streaming shopping in e-commerce.

Live streaming has been widely discussed as a new media form that triggers people's continuous watching behavior (Kaytoue et al., 2012; Sjöblom & Hamari, 2017). Unlike other live-streaming platforms, the live-streaming shopping platform is based on the background of e-commerce and has a strong results-oriented purpose, that is, live viewers are supposed to generate more purchases.

According to a report by CBNDData (2020), Viya and Li Jiaqi, the top two live-shopping streamers in China, attracted 82 million viewers and 62 million viewers, respectively, while the amounts of their sales reached more than 1.1 billion yuan and 696 million yuan, respectively, in only one day (November 10, 2020). It can be seen that live streaming shopping, as a new form of media channel in e-commerce, has a powerful effect in promoting the transaction. Nearly all the large tech and e-commerce companies, including Alibaba and JD.com, have joined the live-streaming shopping market. Similarly, major retailers like Amazon in the US have also seen the enormous potential effect of live streaming in e-commerce and

have expanded their e-commerce to encompass live-streaming shopping since 2019 (Wowza Media Systems, 2019). It seems that live streaming has become a trend in e-commerce.

However, people who are unwilling to use live-streaming shopping have expressed their concerns. According to a report by the Chinese Consumer Association (CCA) in 2020, product quality (60.5%) and after-sales service (44.8%) are the two main reasons why people reject the use of live-streaming shopping. This shows that the consumer's perceived risk still exists in live-streaming shopping. Perceived risk is related to uncertainty in online shopping and has been widely recognized in e-commerce studies as a major factor that obstructs sales (Forsythe & Shi, 2003; Michaelidou & Christodoulides, 2011). Online consumers tend to reduce their perceived risk in transactions by reading reviews of the goods and learning about the merchants' reputations. When it comes to the live streaming context, the attractiveness and influence of the streaming media deeply affect the engagement of consumers who are addicted to the streaming shopping environment (Cai et al., 2018). Consumers may consequently neglect the risk when they are addicted to the live streaming environment.

The perceived risk in online shopping comes from their lack of face-to-face interaction, which may be reduced in the live streaming shopping environment. In live-streaming shopping, customers can submit questions directly via the bullet screen and get a response from streamers in time, which will consequentially affect customer purchase behavior (Chen et al., 2017; Zhou et al., 2018). Compared to traditional online shopping, which only depends on the text, picture or video, consumers can obtain rich information through the streamer's presentation, products information page, and other consumers' comments at the same time through live streaming. The streamer's vivid introduction of the products also increases the customer's trust and elicits a higher degree of purchase intention (Hajli, 2015).

As an emerging business model, live streaming shopping has not been fully explored (Sun et al., 2019). Previous research investigated the different factors that may influence the customer's purchase intention in live-streaming shopping from different perspectives, such as the IT affordance perspective (Sun et al., 2019), marketing strategy perspective (Min et al., 2019) and the streamer's endorsement and product matching perspective (Park & Lin, 2020). Although the perceived risk is a focal cognitive factor in affecting the consumer's behavior, the antecedents that may decrease the customer's risk perception in live-streaming shopping are still vague. Furthermore, there is little research that investigates the factors influencing customer behavior from the perspective of "holistic customer environment interaction" (Xu et al., 2020). In addressing the gaps above, this study adopts the stimulus-organism-response (S-O-R) model as a framework to answer the research question: How does the live-streaming shopping affect the consumer's perceived risk and purchase intention?

The SOR framework states that the crucial elements of the environment serve as the stimuli that affect the individual's internal states, leading to the behavioral responses. Customers are stimulated by numerous stimuli in the live streaming environment, which affects their risk perception and consequently affects their shopping intention.

The present research is able to further extend the SOR model to the live streaming context. Specifically, it investigates the stimuli in live streaming that will affect the users' perceived risk and explores how the perceived risk influences the users' purchase intention. With a good understanding of the customer's purchase intention, live streaming practitioners will develop effective marketing strategies to attract new and potential live streaming customers.

Literature Review and Hypothesis Development

Live streaming shopping and SOR model

Live streaming shopping is defined as the delivery of e-commerce transactions through a real-time streaming platform, which creates a virtual space with a highly interactive chance for both streamers and consumers. (Xu et al., 2020). Sun et al. (2019) believed that live-streaming shopping is a new form of social commerce. However, live-streaming shopping has its own characteristics, such as simultaneity and authenticity (Cai et al., 2018). Wongkitrungrueng and Assarut (2020) demonstrated that the role of the streaming media is to connect the shoppers and the sellers in real time by providing an immersive purchasing experience, leading to a more interpersonal connection. Li et al. (2018) also suggested that the two-way simultaneous communication between the streamers and the viewers, and the posts of other viewers will reduce the consumers' uncertainty and increase their trust.

It can be seen that the consumer's perceived risk will be reduced in the live streaming environment compared to traditional online shopping. However, studies on the factors that affect an individual's risk perception in the context of live-streaming shopping are limited. Previous research has mainly discussed the viewer's motivation in watching live-streaming shopping and has investigated the influence of certain real-time streaming attributes on viewers' behaviors. Specifically, Cai et al. (2018) have adopted content analysis to analyze the utilitarian and hedonic motivations for viewers watching live-streaming shopping. Sun et al. (2019) examined how IT affordance (including visibility, metavoicing and guidance) positively influence the viewers' engagement and purchase intention in live-streaming shopping. Park and Lin (2020) also investigated the effects of source-product fit on the viewer's purchase intention in live streaming. To fill this gap in the literature, the Stimulus-Organism-Response (SOR) framework is adopted in this study to conceptualize the effects of contextual cues in the live-streaming shopping context on the consumer's perceived risk and purchase intention.

The SOR model was proposed by Mehrabian and Russell in 1974 in the field of environmental psychology and has been widely used in online shopping studies to understand the consumer's behavior (Eroglu et al., 2003; Chan et al., 2017). The SOR model puts forward the view that the online shopping environment contains atmospheric stimuli (S), leading to changes in individuals' cognitive and emotional states (O) and then influencing their response (R) (Eroglu et al., 2003). According to the SOR model, the stimuli can be represented by different forms of the external environment. Previous studies have identified and classified different environmental stimuli such as relational bonds (Hu & Chaudry, 2020) and parasocial interaction (Xu et al., 2020) that affect their customers' engagement or impulse buying mediated by their cognitive and affective reactions in the live streaming context. Thus, we believe that this framework is suitable for investigating the antecedents in live-streaming shopping that trigger the cognitive change and behavioral response.

This paper identifies the streamer's credibility, media richness and interactivity as the stimuli that influence the customers' perceived risk (organism) and which in turn may affect their purchase intention (response). These will be further discussed in the next section.

Stimuli in live-streaming shopping

Streamer's credibility

Endorser credibility is one of the focal issues of source credibility in the advertising domain (Goldsmith et al., 2000). Endorser credibility refers to the endorser in terms of the extent to which the endorsements are believable from the customers' perspective (Ohanian, 1990). According to Ohanian, credibility is identified as the endorser's attractiveness, expertise and trustworthiness as perceived by the audience.

The streamers in live-streaming shopping can be regarded as the endorsers of the product. Their presentations regarding the product are usually the main approach to promoting commercial information (Xu et al., 2020). Customers can obtain all the product information from the streamer's introduction instead of searching and comparing the information for different products by themselves. In addition, streamers not only provide the viewer with useful information about the product, but create a pleasant experience during the live streaming (Chen & Lin, 2018). Furthermore, the endorser's credibility is essential in decreasing the consumers' perceived risk. Soesilo and Arimbi (2020) found that the consumers' risk perception was reduced when exposed to a product endorsed by endorsers that they believed in.

In this study, the streamer's credibility is the stimulus in live-streaming shopping. The streamer's attractiveness refers to the streamer's personality, appearance and talent as perceived by the viewers from the live streaming (Ha & Lam, 2017). The streamer's expertise refers to the extent to which the streamer is regarded as an expert who provides adequate information about the product (Homer & Kahle, 1990). The

streamer's trustworthiness is related to the consumer's confidence in the streamer's honesty, believability and integrity (Erdogan, 1999). Existing studies on streamers' credibility only indicate that their attractiveness (Xu et al., 2020) and trustworthiness (Park & Lin, 2020) positively affect purchasing behavior in live-streaming shopping. However, a few studies have included 'expertise' as a factor in the streamer's credibility. As discussed above, streamers need to demonstrate and introduce diverse content in their live streaming, such as fashion, food, and beauty products, when compared with traditional endorsers. Meanwhile, they should answer the text-based questions raised by the audience in a timely manner. Such a lengthy presentation is a challenge for their professional sales skills. Thus, the streamer's expertise is a crucial dimension in credibility in live-streaming shopping.

Media richness

Media richness refers to the media's ability to transmit needed information (Daft and Lengel, 1986). The theory is derived from information processing theory and states that richer media would be more effective in dealing with ambiguous messages than less rich media (Daft and Lengel, 1998). Vickery et al. (2004) demonstrated that more communication using rich media could enhance performance and satisfaction in the business.

Daft and Lengel (1986) presented four criteria in relation to this theory to predict the richness of the media, including the capacity for immediate feedback, language variety, the capacity for personal focus, and multiple cues. There are also four features in live streaming, including immediate feedback, multiple cues and language variety, which fully satisfy the media richness theory's requirements. In addition, live streaming can add richness by incorporating the streamer's live video, instant text communication with streamers, and bullet comments with other customers.

Furthermore, previous studies have found that the perceived media richness positively affects the consumer's online purchase intention (Brunelle and Lapierre, 2008), the user's gratification, and loyalty to the live streaming channel (Hsu et al., 2020). Based on the literature, it is appropriate for this research to apply media richness as the stimulus in examining risk perceptions in a live shopping environment.

Interactivity

Steuer (1992) defined interactivity as the extent to which the consumer participates in modifying the form and content in real time. Live streaming has the highest level of interactivity in e-commerce.

The simultaneous interactivity in live streaming provides a channel through which streamers can respond to the viewer's inquiries about the product while the viewers can obtain the information they need in a timely manner (Hilvert-Bruce et al., 2018). Cai et al. (2018) identified "interacting with others (including streamers and other

viewers)” as one of the primary reasons why consumers use live-streaming shopping instead of ordinary online shopping. Because real-time media create a socially friendly shopping environment, real-time media develop a pro-social relationship between the streamers and shoppers, which convinces consumers that the product information that they recommend is more reliable and less risky (Hu et al., 2017). In addition, customers can also view other customers’ feedback from the bullet comments. Previous studies have generally found that checking online reviews before making purchase decisions helps customers reduce their uncertainty and risk in regard to their online shopping (Park & Lee, 2009; Mo et al., 2015).

To sum up, the streamer’s credibility, media richness and interactivity are three determinants of the environmental stimuli that affect the consumers’ perceived risk in the context of live-streaming shopping. Based on the literature, the following hypotheses are proposed:

- H1. The streamer’s credibility is negatively associated with the viewer’s perceived risk.
- H2. Media richness is negatively associated with the viewer’s perceived risk.
- H3. Interactivity is negatively associated with the viewer’s perceived risk.

Perceived Risk as an organism and Purchase Intention as a response

Perceived risk is associated with uncertainty in the e-commerce environment (Jing et al., 2016). Hansson (2004) conceptualized the risk as referring to the possibility of the occurrence of accidents and the invalidity of the event. Yang et al. (2016) further indicated that potential financial risk, time risk, the performance risk of products, psychological risk, and social risk are the general perceived risks when shopping online. Pavlou et al. (2007) discussed the origins of the risks from the principal-agent theory perspective. They considered that the perceived risks were derived from the consumer’s uncertainty regarding the concealed information or actions in online transactions. When it comes to the live-streaming context, the consumers’ perceived risk comes from the streamer’s deliberate behavior of hiding information on either products or transactions, such as providing incomplete information about the product, or even fake information. In the field of consumer behavior, this will result in some of the negative consequences of the purchase intention when the perceived risk increases (Michaelidou & Christodoulides, 2011).

Dai et al. (2018) indicated that how people make decisions in uncertain situations has always been a research focus in the field of communication and media psychology. In live-streaming shopping, the purchase intention of consumers is directly related to whether they will make a purchase. Salisbury et al. (2001) considered that the shopper’s purchase intention in the online shopping environment determines the intensity of the customer’s intention to make a specific purchase through the Internet. Other scholars have further proved that perceived risk is negatively associated with the customer’s online attitude toward purchasing (Yang et al., 2016). Furthermore,

Fernandez (2017) discussed the relationship between the online shopper’s perceived risk and the purchase attitude, and considered that perceived risk was the determinant of the online customer’s purchase intention.

As discussed above, cognitive assimilation from stimuli refers to the mental processes that occur in the brain when an individual interacts with environmental stimuli in the SOR model (Eroglu et al., 2003). Thus, this paper identifies perceived risk as the cognitive assimilation (Organism), and the purchase intention as the consumers’ response. Based on the literature, the following hypothesis is proposed:

H4. Perceived risk is negatively associated with the viewer’s purchase intention. Our research model is shown on Fig.1.

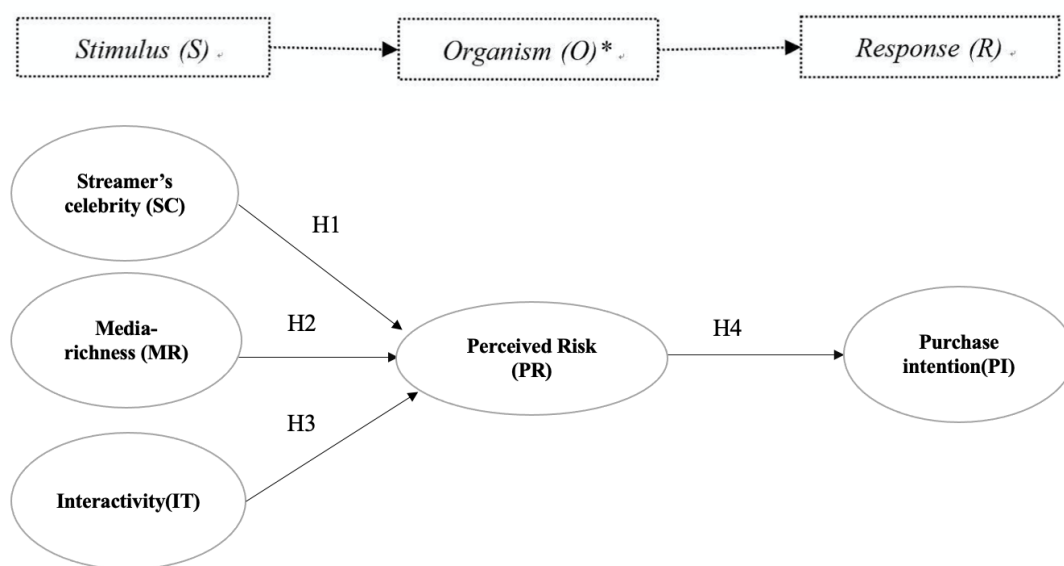


Fig1. The research model based on the SOR paradigm

Methodology

Sampling and Data collection

The data was collected through an online survey by Sojump (www.sojump.com), a professional survey company that provides payment data collection services. Only those participants who had live streaming shopping experiences on Taobao were invited to fill out this survey. Taobao was chosen in this study because it is the largest and a very widely-used live-streaming shopping platform in China (Hu & Chaudhry, 2020; Xu et al., 2020).

Screening questions were adopted in the questionnaire (e.g., Have you ever seen Taobao live? How often do you see Taobao live?). If the respondents did not provide consistent answers to these questions, their responses were classified as invalid. The data was collected from April 13, 2021 to April 20, 2021.

To address the ethical issues in the research, we adopted several strategies. First of all, ‘informed consent’ was adhered in order to help participants fully understand the objectives and aims of this proposed study. Besides, the anonymity of participants was ensured to protect their privacy. The data collected was only used for this proposed study and the data will be destroyed after the study is completed.

A total of 341 valid questionnaires were collected, and all the respondents came from Mainland China. Table 1 presents the respondents’ demographic information for this study. Of the 341 valid responses, 34.9% of the respondents were between 25 and 30 years old, and 32.6% of the respondents were 31-36 years old. The female respondents accounted for 61.3% of the total and male respondents for 38.7%. In addition, the results also indicated that 57.1% of the respondents had more than 6 years of online shopping experience. Furthermore, 46.6% of the respondents watched live-streaming shopping 3 to 4 times a week.

Table 1. Demographics of Respondents (N = 341)

| Variables | Category | Frequency (%) |
|--|-------------------------------|---------------|
| Age | 18-24 | 60 (17.6%) |
| | 25-30 | 119 (34.9%) |
| | 31-36 | 111 (32.6%) |
| | 37-45 | 39 (11.4%) |
| | 46-50 | 5 (1.5%) |
| | 51 or above | 7 (2.1%) |
| Gender | Male | 132 (38.7%) |
| | Female | 209 (61.3%) |
| Education | Middle school degree or below | 1 (0.3) |
| | High school | 8 (2.3%) |
| | Bachelor’s degree | 295 (86.5%) |
| | Master’s degree or above | 37 (10.9%) |
| Online shopping experience (years) | 1 year or less | 2 (0.6%) |
| | 2-3 years | 36 (10.6%) |
| | 4-5 years | 102 (29.9%) |
| | 6-7 years | 115 (33.7%) |
| | 8 years or more | 86 (25.2%) |
| Frequency of watching live streaming shopping (times/week) | 1-2 | 94 (27.6%) |
| | 3-4 | 159 (46.6%) |
| | 5-6 | 51 (15%) |
| | 6 or above | 37 (10.9%) |
| Monthly disposable income (RMB) | below 3000 | 35 (10.3%) |

| | | |
|----------------|----|---------|
| 3000-5000 | 58 | (17%) |
| 5001-7000 | 52 | (15.2%) |
| 7001-9000 | 63 | (18.5%) |
| 9001-12000 | 71 | (20.8%) |
| 12001-15000 | 36 | (10.6%) |
| 15000 or above | 26 | (7.6%) |

Measurement

For the validation and testing of the hypotheses, a closed-ended questionnaire was developed and the online survey was conducted to collect the empirical data. All the measures for our 5 constructs were identified from the previous literature and modified to some degree to fit the context of the live-streaming shopping context (see Table 2). We used a seven-point Likert scale ranging from (1) strongly disagree to (7) strongly agree to measure all the items, in order to indicate the kinds of responses to the questions of each respondent.

Table 2. Measurement items

| Constructs | Measurement Items | Sources |
|---|--|---|
| Streamer's credibility (SC) | SC1: I think that the streamer is intelligent. | Ha and Lam, 2017; Choi and Lee, 2019; Hwang and Kim, 2007 |
| | SC2: I think that the streamer has an enjoyable live-streaming style. | |
| | SC3: I think that the streamer has a funny personality. | |
| | SC4: I think that the streamer has an appealing appearance. | |
| | SC5: The streamer knows very much about the product/service. | |
| | SC6: It is an undeniable fact that the streamer is an expert on the product/service. | |
| | SC7: The streamer has a lot of experience with the product/service. | |
| | SC8: The streamer is likely to see/read a lot of reference sources/materials related to the product/service. | |
| | SC9: The streamer gives viewers information about the product/service. | |
| | SC10: I expect that the streamer will keep promises that he/she makes. | |
| | SC11: I expect the streamer to have good intentions towards me. | |
| | SC12: I expect the streamer's intentions to be benevolent. | |
| MR1: Live streaming allows my communication partners (the streamer, other viewers) and me to give | | |

| | | |
|-------------------------|---|--|
| Media richness (MR) | <p>and receive timely feedback</p> <p>MR2: Live streaming allows my communication partner and me to tailor our messages to our own personal requirements</p> <p>MR3: Live streaming allows my communication partner and me to communicate a variety of different cues (such as emotional tone, attitude) in our messages.</p> <p>MR4: Live streaming allows my communication partner and me to use rich and varied language in our messages.</p> | Carlson and Zmud, 1999 |
| Interactivity (IT) | <p>IT1: The streamer is willing to communicate with me.</p> <p>IT2: I can get a lot of good advice from the streamer.</p> <p>IT3: The streamer has the ability to respond to my specific questions quickly and efficiently.</p> <p>IT4: I can communicate in real time with other customers in live-streaming shopping.</p> <p>IT5: Other consumers' real-time comments have helped me make my purchase decisions.</p> | Liu, 2003; Wu and Wu, 2006 |
| Perceived Risk (PR) | <p>PR1: I am worried that the product has failed to meet the performance requirements originally described by the streamer.</p> <p>PR2: I am worried that the after-sales service will not be good.</p> <p>PR3: I feel worried about purchasing through live streaming.</p> <p>PR4: I am worried that shopping through live streaming will not be approved by my family or friends.</p> <p>PR5: I am worried that the prices of the products in live streaming are higher than the prices in other places.</p> <p>PR6: I am worried about wasting my time in live streaming shopping.</p> | Jacoby and Kaplan, 1972 |
| Purchase intention (PI) | <p>PI1: I prefer purchasing products through live streaming.</p> <p>PI2: If I were going to buy the product online, I would consider buying the product through live streaming.</p> <p>PI3: I will have the purchase intention through live streaming even I do not have a need for shopping.</p> <p>PI4: When I am watching live streaming, I sometimes have the purchase intention even though I do not need to do the shopping.</p> | Dodds et al., 1991; Hong and Cha, 2013 |

The streamer's credibility in this study refers to the streamer's attractiveness, expertise and trustworthiness. The constructs for the streamer's attractiveness in our study were adapted from Ha and Lam's (2017) research, the constructs for the streamer's expertise were adapted from Choi and Lee's (2019) study, and the constructs for the streamer's trustworthiness were adapted from Hwang and Kim (2007). In all, 12 items were adopted to measure the streamer's credibility ($M=5.46$, $SD=0.64$, $\alpha=0.85$).

Four items were adapted from the work of Carlson and Zmud (1999), and were used to measure media richness ($M=5.47$, $SD=0.70$, $\alpha=0.64$). Six items were adapted from the studies by Liu (2003) and Wu (2006) to measure the interactivity ($M=5.39$, $SD=0.76$, $\alpha=0.72$). Perceived risk in this study included the potential financial risk, time risk, the performance risk of products and hidden actions regarding the live-streaming shopping transactions. Based on previous research (Jacoby and Kaplan, 1972), 6 items were used to measure the perceived risk ($M=3.90$, $SD=1.16$, $\alpha=0.87$).

In this study, purchase intention includes the level of willingness to purchase products through the live streaming platform. Moreover, all the items for the purchase intention ($M=5.45$, $SD=0.73$, $\alpha=0.7$) were adapted from Chen and Barnes (2007) and Koufaris and Hampton (2004). Besides, potential variations in the dependent variable caused by the four control variables were considered here, including gender, age, the education level and online purchase experience. Since all the measurement items were initially written in English, and the respondents in this study were all Chinese, the back-translation method was employed to ensure translation validity. Specifically, all the items were first translated into Chinese by a native Chinese speaker, and then another researcher independently translated the entries into English. Finally, the two researchers compared the two English versions and jointly developed the first Chinese version.

A pilot study was conducted in advance on a small group of volunteers who had live-streaming experience on Taobao Live to iron out any potential problems with the proposed survey. Sixty participants participated in our pilot test. All the constructs of the measures were proved to have good reliability and validity, and we made some minor revisions to improve the items' wording and suitability. Eventually, the questionnaire consisted of three parts: the purpose of the questionnaire, instruments measuring the conceptual model constructs, and demographic information.

Data Analysis and Results

Reliability and Validity test

In order to test the consistency and reliability of the items, Cronbach's alpha reliability analysis was first used in our study to examine all the constructs. Besides, we used factor analysis as a tool to measure the construct validity. Based on our results, Cronbach's alpha for the constructs ranged from the lowest of 0.645 (Media richness) to 0.852 (Streamer's credibility). The value of Kaiser-Meyer-Olkin (KMO) ranged from 0.698 (Media richness) to 0.895 (Streamer's credibility) which shows

that the factor analysis was appropriate in our study. Moreover, the Bartlett test of sphericity was significant ($p < 0.01$, $N = 341$) for all the correlations within a correlation matrix. All the measurements exhibited nice reliability and validity.

Results

In this study, we first conducted the analysis of the descriptive statistics and correlation using SPSS 25. As presented in Table 3, the streamer's credibility was positively correlated with media richness, interactivity and purchase intention. Media richness was positively correlated with interactivity and purchase intention. Interactivity was also positively correlated with purchase intention. In addition, Streamer's credibility, media richness, interactivity and purchase intention were negatively correlated with perceived risk.

Table 3. Descriptive statistics and correlations between variables

| Variables | M(SD) | 1 | 2 | 3 | 4 | 5 |
|--------------------------|------------|----------|----------|----------|----------|---|
| 1.Streamer's Credibility | 5.46(0.64) | — | | | | |
| 2.Media Richness | 5.47(0.70) | 0.607** | — | | | |
| 3.Interactivity | 5.39(0.76) | 0.684** | 0.621** | — | | |
| 4.Perceived Risk | 3.90(1.16) | -0.481** | -0.262** | -0.371** | — | |
| 5.Purchase Intention | 5.45(0.73) | 0.594** | 0.412** | 0.502** | -0.403** | — |

Note: $N=341$, ** $p < 0.01$

Hypothesis testing

To test the hypotheses, multiple ordinary least squares (OLS) regression was conducted using perceived risk and purchase intention as the dependent variables. The first model measured the extent to which perceived risk could be explained by the streamer's credibility, media richness and interactivity. The second model measured the extent to which purchase intention could be explained by the streamer's credibility, media richness and interactivity. The third model measured the extent to which purchase intention could be explained by the streamer's credibility, media richness, interactivity and perceived risk.

As can be seen from Model 2 ($F = 16.5$, $R^2 = 0.285$ $p < 0.001$) and Model 3 ($F = 25.47$,

$R^2 = 0.409$, $p < 0.001$), when controlling for gender, age, education, monthly disposable income and online shopping experience, the streamer's credibility negatively predicted perceived risk ($\beta = -0.757$, $SE=0.124$, $p < 0.001$), but the streamer's credibility positively predicted purchase intention ($\beta = 0.507$, $SE=0.071$, $p < 0.001$). In addition, the perceived risk was negatively associated with purchase intention ($\beta = -0.070$, $SE=0.031$, $p < 0.05$). The results also indicated that the streamer's credibility partially mediated the relationship between the perceived risk and the purchase intention. Therefore, only H1 and H4 were supported. Moreover, interactivity was positively associated with purchase intention ($\beta = 0.148$, $SE=0.06$, $p < 0.05$).

Table 4. The multiple OLS regression coefficient for predicting perceived risk and purchase intention for live-streaming shopping

| β (SE) | | | | | |
|--------------------------------------|------------------|--------------------|------------------|--------------------|--------------------|
| N=361 | | | | | |
| | Model 1 | | Model 2 | | Model 3 |
| | Perceived risk | Purchase intention | Perceived risk | Purchase intention | Purchase intention |
| Step 1: Demographic Variables | | | | | |
| Gender | -0.163 (0.127) | 0.079 (0.08) | -0.169 (0.115) | 0.083 (0.066) | 0.072 (0.066) |
| Age | -0.226***(0.061) | 0.073(0.038) | -0.179(0.055) ** | 0.039(0.032) | 0.026 (0.032) |
| Education | 0.210 (0.167) | -0.015(0.105) | 0.235(0.151) | -0.166(0.087) | -0.149 (0.087) |
| Monthly disposable income | -0.108(0.038) ** | 0.105***(0.024) | -0.062(0.035) | -0.062** (0.020) | 0.058** (0.020) |
| Online shopping experience | -0.068(0.066) | 0.017(0.042) | 0.005(0.060) | -0.041(0.034) | -0.04 (0.034) |
| Step 2: Independent Variables | | | | | |
| Credibility | - | -- | -0.757***(0.124) | 0.507*** (0.071) | 0.454*** (0.075) |
| Media richness | -- | -- | 0.148(0.104) | 0.009 (0.060) | 0.02 (0.06) |
| Interactivity | -- | -- | -0.162(0.105) | 0.159**(0.060) | 0.148* (0.06) |
| Perceived risk | -- | -- | -- | -- | -0.070* (0.031) |
| R2 | 0.103 | 0.093 | 0.285 | 0.40 | 0.409 |
| F | 7.67 | 6.8 | 16.5 | 27.69 | 25.47 |

Conclusion and discussion

This study has sought to provide a theoretical explanation of how live-streaming shopping affects the consumer's perceived risk and purchase intention. By applying the S-O-R model in this study, the streamer's credibility, media richness and interactivity were identified to represent the stimuli in the context of live-streaming shopping. In addition to providing a theoretical framework to determine the effect of these environmental stimuli, the perceived risk was adopted as the consumer's cognitive state, and purchase intention was recognized as the consumer's response. Our results confirm that the perceived risk in live-streaming shopping was negatively

associated with the purchase intention. In addition, the streamer's credibility partially mediated the relationship between the perceived risk and the purchase intention. The findings are consistent with previous empirical research on the endorser's credibility in relation to the perceived risk (Soesilo et al., 2020) and purchase intention in online shopping (Lafferty et al., 2002).

However, media richness has no significant effect on the perceived risk and purchase intention in our study. The following possible explanations are provided. First, people acquire more information before purchasing high-value products than low-value products, and media richness is more efficient in promoting high-perceived risk products (Wei & Lu, 2013). Since the participants in our study may not purchase high-risk products through live-streaming shopping, media richness does not influence their perceived risk and purchase intention. Second, information quality may affect the customer's purchase decision. Even if consumers can obtain information that is as rich as possible in live-streaming shopping, if the information cannot meet their perception of its "usefulness, reliability and completeness" (Hilligoss & Rieh, 2008), it may also be hard to facilitate their consumption decisions.

Although interactivity is positively associated with the purchase intention, which is consistent with previous studies (Jiang et al., 2010), it was not found to be significantly related to the perceived risk. A possible explanation may be that interactivity in live-streaming shopping includes the interaction between the consumer and the streamer as well as the interaction with other consumers. While consumers can obtain all the information about the product from their interactions with the streamers, the streamers may also be the source of the risk (Lim, 2003), in that they may hide the unfavorable information regarding the transaction to increase their sales. In addition, product reviews can positively reduce people's risk perceptions and facilitate their purchase intention (Park & Lee, 2009; Mo et al., 2015), although the bullet comments in live-streaming shopping may be added too quickly to generate enough product-related discussion. As a result, interactivity has no significant effect in terms of reducing the consumers' perceived risk in regard to live-streaming shopping.

This study contributes to both theory and practice. It uses an empirical method to examine the mediated effects of the streamer's credibility on the perceived risk and purchase intention. It further contributes to the SOR model by extending it to the live-streaming shopping context. This study also has some practical contributions. First, our findings support the critical role of the streamer's credibility in reducing the perceived risk and increasing the purchase intention. In addition, it provides some implications for current e-commerce businesses that plan to evolve into live-streaming shopping, such as by applying the results to their marketing strategies. We suggest that practitioners use streamers with a high degree of attractiveness, expertise, and trustworthiness to promote products, thereby directly reducing the consumers' perceived risk and increasing their purchase intention.

Limitations and future research directions

While this study has provided some valuable results, it also has some limitations. The first limitation concerns the sampled observations. The respondents in our study are all from China. Thus, our results may not be applicable to other cultural and economic contexts. Future research could therefore focus on examining different countries and regions that engage in live-streaming shopping. Second, Taobao is chosen as the only live-streaming shopping platform in this study. It would be interesting for future research to compare the streamer's credibility, customer's perceived risk and purchase intention in relation to different live-streaming shopping platforms. Third, this study has only examined the direct effect of the streamer's credibility on the perceived risk and purchase intention in live-streaming shopping. The streamers' broadcast style, product categories, and even the streamer's gender may also be appropriate moderating variables in this model and warrant further investigation. Other particular cues in live-streaming commerce can also be investigated in order to contribute to a more comprehensive understanding of the development of live-streaming shopping.

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