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Research on the Purchase Willingness of Online Comments of E-Commerce Live Broadcasts

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Abstract: *Based on the SOR model and the two factor influence model of the sender's word of mouth, this paper analyzes the e-commerce live online comments from different dimensions, examines the impact of e-commerce live online comments on consumers' purchase intention, and verifies the regulatory effect of perceived risk. In order to verify the research hypothesis, 301 valid questionnaires were collected, and SPSS and Amos were used for empirical analysis. The research shows that when consumers shop in the live broadcast room, consumers' purchase intention will be affected by the professionalism of reviewers and the quality of online comments, while the number of online comments will not affect it. Both the professionalism of commentators and the quality of commentaries will have an impact on perceived risk. With the reduction of perceived risk, consumers' willingness to buy will increase.*

Keywords: *Online comments; e-commerce live streamingt; purchase intention; perceived risk*

1. Introduction

According to the 48th Statistics of China's Internet Development Report, by the middle of 2021, the number of live streaming users of e-commerce in China has exceeded 380 million. At present, the main domestic e-commerce shopping platforms include Taobao, Kuaishou, Tiktok, Jingdong, Pinduoduo and XiaoHongshu, etc. With the rise of live streaming media technology, these platforms soon launched live streaming sections to open the mode of live streaming with goods. According to the report, more than 70% of the Chinese users indicated that they were inclined to use live streaming platforms to buy their favorite products. Meanwhile, on November 11, 2021,the total sales volume of mainstream e-commerce live streaming platforms reached 737.56 billion yua.Therefore, it is very important to explore the relationship between e-commerce live broadcasting and consumers' purchase intention.

With the development of the Internet, people's satisfaction of the use of a certain product is no longer confined to "word of mouth", online comment has become a new way of comment. Since Amazon launched a service in 1995 that allows consumers to post commodity comments, online comments have become an indispensable part of all e-commerce platforms. Online comments enable people to know the quality and size of products from others' comments, and enable consumers to change their comments on goods from oral statements to specific written descriptions. With the rise of e-commerce live broadcasting, when consumers watch live broadcasting, different from online comments on traditional e-commerce platforms, all consumers who enter the live broadcasting room can express their opinions or questions about the products in the live broadcasting room in real time, regardless of whether they have purchased the products. In addition, e-commerce live online comments are also the main carrier for the interaction between livestream salesperson and users, merchants and users, and between users and users.Therefore, the livestream salesperson can solve the problems raised in online comments, merchants can also see the comments of reviewers on the use of products, and potential consumers can also have a more comprehensive understanding of products through the comments of consumers who have purchased products.[1]

In addition, when consumers buy goods in the live room, there is uncertainty in their purchase behavior, which is called perceived risk. If the risk is greater, users will also have a sense of crisis and will constantly search for information, so as to give themselves a sense of security. The main purpose of doing so is to reduce the perceived risk. In view of this, this study takes the perceived risk of consumers as the intermediary effect, and discusses the influence of various dimensions of online comments on e-commerce live streaming on consumers' purchase intention.

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At present, the academic research on e-commerce live broadcasting mainly discusses the relationship between the livestream salesperson and consumers' purchase intention. Few scholars have conducted the impact on consumers' purchase intention from the perspective of e-commerce live online comments. In general, previous studies have ignored the important role of e-commerce live online reviews on consumers' purchase intention, and have not conducted relevant empirical analysis. Therefore, based on the above deficiencies, the following questions are raised in this study: (1) In the context of e-commerce live broadcasting, will online comments of e-commerce live broadcasting affect consumers' purchase intention and how? (2) Do live online comments of e-commerce have different effects on consumers' purchase intention? (3) Does the perceived risk of consumers play a mediating effect between online comments of e-commerce livestreaming and consumers' purchase intention.[2]

2. Literature and hypothese

2.1. SOR model

Mehrabian modified the "classical stimulus-response" model of earlier psychology by adding the concept of the organism and proposing the SOR model.When considering stimulus, S (stimulus) refers to the stimulus the consumer found in their online purchases,O (organism) refers to the individual consumer in the online purchase scenario, and R (response) refers to the organism's response to an external stimulus. This model shows that consumers generate purchase motivation and finally make purchase decision after encountering the stimulus in purchase(Xiaojuan XU,2015).Kang(2021) finds that there is a dynamic impact between the consumer engagement behavior and the strengeh of connections in streaming commerce platforms by SOR model.[3]

2.2. WOM model

The influence of the sender's word of mouth on the recipient's purchase decision shows that the higher the recipient's professional level, the lower the risk, and the professional ability and word of mouth have a positive impact on the recipient's purchase decision (Bansal&Voyer,2000). The WOM model is shown in Fig 1.

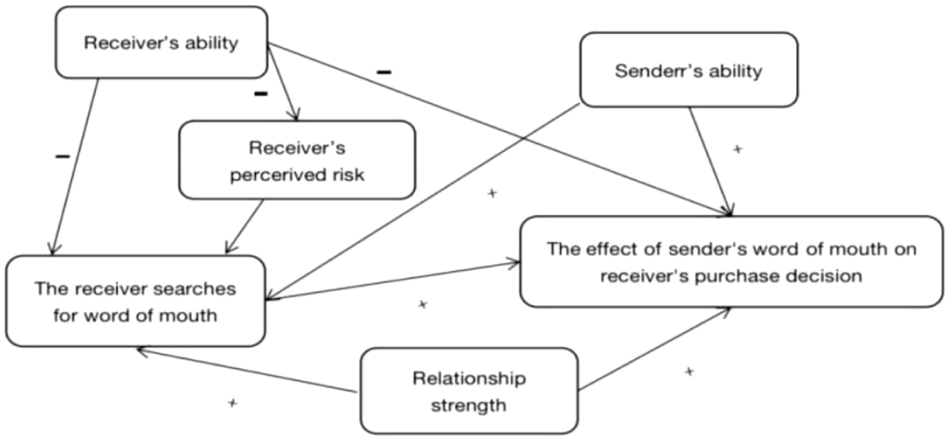

Fig.1 WOM model

1) Online comments influence

The result of a previous research on the influence of online customer comments (Hu Nan,2008) shows that four factors, such as reviewer quality and exposure, can affect consumers' perceived uncertainty and thus affect their purchase decisions.The influence facator model of online comments is in Fig 2.

2) Live online commenter’s professionalism

The source of information will also affect the authenticity of information. All factors should be considered comprehensively when identifying information, such as commenters themselves. If commenters have a high degree of professionalism, it can also increase the trust of consumers, promote consumers' consumption and enhance their purchase intention (Baber A,2016). Therefore, the following hypothesis is proposed:

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Hl: In the context of e-commerce livestreaming, there is a very significant relationship between the professionalism of live online commenters and the purchase intention of consumers, which is a positive correlation.[4]

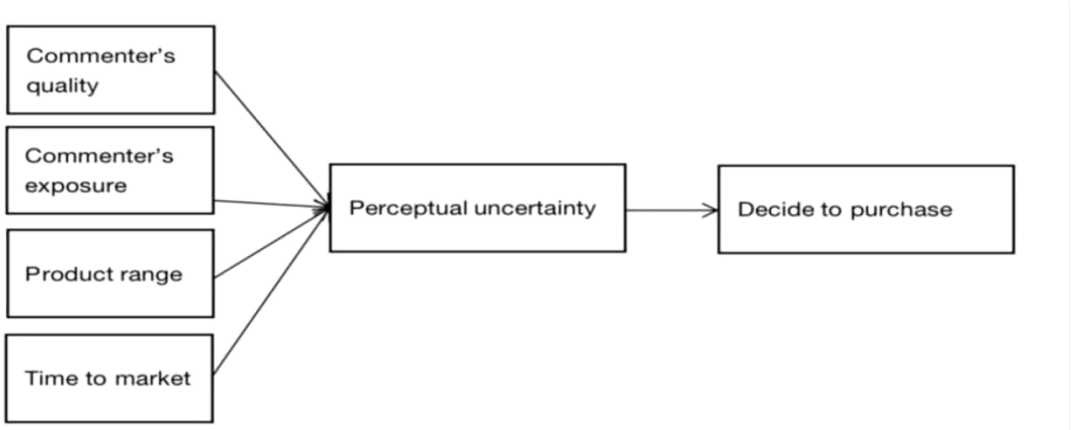

Fig.2 Influence factor model of online comments

3) Live online comment quality

Live online comment quality refers to the authenticity of the comment and the depth of the content, that is, how much information the review can provide consumers about the commodity or service. Y Cang (2021) finds that online word of mouth and website information quality have significant impact on experienced consumers to varying degrees.Huo Hong (2018) studied the richness of the quality of online reviews, which plays an important role in the quality of online comments. The higher the richness of the quality of comments, the higher the quality of comments. High-quality online comments can provide consumers with detailed information about a variety of products or describe the real experience of using the product, which can be of great help to consumers. Low quality evaluation is not conducive to providing reference for others. If personnel make some meaningless comments in the process of live broadcasting, or win people's attention by fake comment, it is also not conducive to consumers' decision-making. Therefore, the following hypothesis is proposed:

H2: In the context of e-commerce livestreaming, there is a very significant relationship between the quality of online comments and consumers' purchase intention, which is a positive correlation.

4) Number of live online comments

The more online comments there are, the greater the stickiness of fans and the better brand of stores in e-commerce live streaming. Because the number of online comments can reflect the business situation of the merchant or the popularity of the livestreaming. On the other hand, if there are a lot of live online comments, under this condition, the public will think this decision is right, and individuals will tend to listen to the choices of the public. Even if they have doubts in their hearts, they still choose to follow the public, so as to follow the trend This is why it is easier for consumers to make purchasing decisions in the live room by reading comments(Mudambi S.M,2010).Therefore, the following hypothesis is proposed:

H3: In the context of e-commerce livestreaming, there is a very significant relationship between the number of online comments and consumers' purchase intention, which is a positive correlation.

5) The perceived risk

Different from offline physical stores, consumers can not personally experience the detailed information of products when watching e-commerce livestreaming, and only grasp the information of streamer's oral words, thus resulting in the perceived risk of purchase. However, as an important way for consumers to obtain information, online comments can greatly shorten the information asymmetry between buyers and merchants(Horvath, 2021). Online comments can provide better reference for customers, and to a certain extent, can also reduce the perceived risk. Through online comments, consumers will have a basic judgment in their mind, which also has certain advantages and can better avoid risks and make correct evaluation. Combined with the actual situation, consumers will obtain information based on online comments when watching livestreaming,which is conducive to better purchase of consumers(Jiang Y,2006). If content related to negative information of products is expressed in online comments, it also increases the perceived risk invisibly, which is not conducive to consumer

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purchase. The following conclusions can be drawn:

H4-1: In the context of e-commerce livestreaming, the perceived risk has an intermediary effect, which is an effect between the professionalism of online commenters and their purchase intention.

H4-2: In the context of e-commerce livestreaming, the perceived risk has an intermediary effect, which is an effect between the quality of online comments and purchase intention.

H4-3: In the context of e-commerce livestreaming, the perceived risk has an intermediary effect, which is an effect between the number of online comments and purchase intention.

6) Model construction

According to SOR model, this research believes that in the context of e-commerce livestreaming, consumers will arouse a series of emotional reactions after being stimulated by various aspects of the live room, and then make purchase behavior. Based on the perspective of online comments, consumers will notice the comments of users in the live room, generate motivation under the stimulation of the comments, and finally make the decision whether to purchase. Furthermore, according to the above two models, this paper divides online comments on e-commerce livestreaming into two parts, namely comment source and comment content. Comment source refers to the professionalism of commenters on e-commerce livestreaming, while comment content refers to the quantity and quality of online comments on livestreaming, and the perceived risk is taken as the intermediate variable.Therefore, the model of this paper is shown as Fig 3.

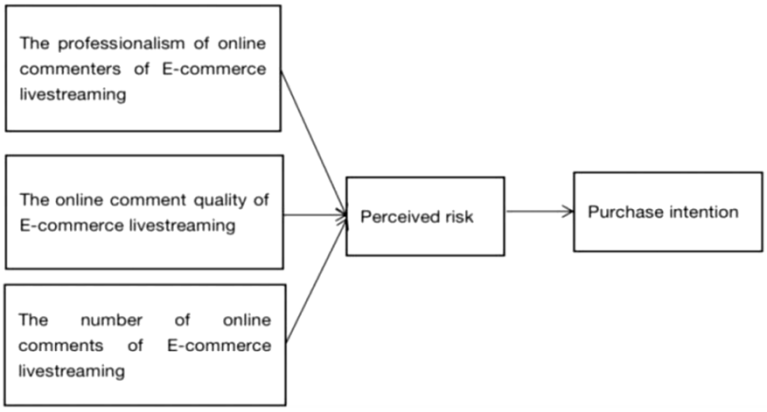

Fig.3 The model of the impact of live online comments of e-commerce on consumers' purchase intention

3. Methodology

Based on the existing literature and the actual situation of this paper, the questionnaire is designed. Then, the data of the collected questionnaires are analyzed, and the hypotheses are analyzed empirically. Finally, the conclusions are drawn to provide more meaningful reference opinions. The questionnaire structure of this paper is as follows: questionnaire title, description and content. The content of the questionnaire is divided into four categories. The first category is about user's personal information, the second category is about user behavior information, the third part is about the factors affecting user's purchase intention, and the last part is about user's purchase intention.[5]

In order to ensure the accuracy and credibility of the survey results, the questionnaire survey based on the network relationships of family members and friends. Secondly, the authenticity of sample data is also screened, such as whether the same IP address is filled in repeatedly and whether the same scale has only one option. Therefore, some invalid questionnaires are eliminated. The survey lasted more than two months from the beginning of January 2022 to the middle of March 2022. A total of 341 questionnaires were collected.[6]

3.1. Testing of validity and reliabilit

According to the reliability analysis results of the measurement items of each variable in Table 1, the Cronbach's α is greater than 0.8, which indicates that the scale is highly reliable.

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Table 1 Reliability Statistics.

Variables	**(CITC)**	**Cronbach's Alpha if Item Deleted**	**Cronbach's α**
Number of live online comments	0.712	0.888	0.899
Live online comment quality	0.748	0.878	
Live online commenter's professionalism	0.655	0.897	
Purchase intention	0.813	0.863	
Perceived risk	0.847	0.855	

Validity analysis can be divided into three different contents, including content, structure and criterion(EisingaR,2013). This questionnaire is designed based on a large number of literature materials, which can be considered to have high content validity. Therefore, this study will analyze the structural validity and adopt factor analysis method.[7]

Table 2 shows the KMO value of the total quantity table and the Bartlett sphericity test results. It can be seen that KMO value is 0.720, indicating that there is a good correlation between each measurement item. Meanwhile, p value is 0.000, less than 0.05, which is suitable for factor analysis. It can be seen from the following Table3 that the commonality value of all research items is higher than 0.4, indicating that the information of research items can be effectively extracted.

Table 2 Barlett's test

KMO	.720	
Bartlett's Test	Approx. Chi-Square	1406.072
	df	105
	P value	.000

Table 3 Factor analysis

Name	Factor loading					Communality
	Factor1	Factor2	Factor3	Factor4	Factor5	
Q1-1	-0.016	0.112	0.854	0.352	-0.200	0.907
Q1-2	0.163	-0.004	0.876	-0.231	0.251	0.910
Q2-1	0.735	0.023	0.022	0.420	0.098	0.727
Q2-2	0.914	0.129	0.106	0.090	-0.024	0.872
Q2-3	0.413	0.037	0.046	0.825	0.120	0.869
Q3-1	0.111	0.902	0.087	0.048	0.078	0.842
Q3-2	0.038	0.411	0.049	0.127	0.848	0.908
Q3-3	0.038	0.751	-0.005	-0.004	0.364	0.697

In addition, the variance interpretation rates of the 5 factors are 23.514%, 14.627%, 12.071%, 10.610% and 8.524%, respectively in Table4. The cumulative variance interpretation rate after rotation is greater than 50% that we can see in Table 4, which means that the information of research items can be effectively extracted.

Table 4 Factor analysis of total online comments table

Factor	Eigen			% of Variance(Unrotated)			% of Variance(Rotated)		
	Eigen value	% of Variance	Cumulative % of Variance	Eigen value	% of Variance	Cumulative % of Variance	Eigen value	% of Variance	Cumulative % of Variance
1	3.527	23.514	23.514	3.527	3.514	23.514	2.502	16.682	16.682
2	2.194	14.627	38.141	2.194	14.627	38.141	2.223	14.818	31.500
3	1.811	12.071	50.212	1.811	12.071	50.212	2.079	13.858	45.358
4	1.592	10.610	60.823	1.592	10.610	60.823	2.046	13.641	58.999
5	1.279	8.524	69.347	1.279	8.524	69.347	1.552	10.348	69.347

3.2. CMV Test

Common method biases generally come from the following sources: the biases caused by the same data source, the characteristics of the questionnaire topic, the biases caused by the content of the questionnaire and the biases caused by the measurement time and place(Xiong H & Zhang C, 2018). Based on the sources of the biases, this paper needs to conduct CMV test. There are two ways to test. In order to make a better analysis, this Research comprehensively considers all factors and decides to first

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adopt Harman single factor test. Under general conditions, if the variance interpretation rate of the first factor is less than 40%, it is considered that there is no common method bias (Zhon H & Zhang J , 2012). It can be seen from Table 4that the variance interpretation rate of the first factor is less than 50%, so it can be judged that there is no common variance.[8]

Then, using confirmatory factor analysis, the following steps are followed. Start by adding a common method factor to the model to ensure that it includes all of the variables mentioned before. If the measured index does not meet the standard, it indicates that the model does not have a strong degree of fit and does not meet the ideal expectation, and it also indicates that there is no common method deviation in the data (Du J & Zhao G,2005).

It can be seen from Table 5 that the actual values of variables do not meet the judgment criteria of indicators, indicating that the model is well fitted and there is no common method deviation.[9]

Table 5 The fitting value after adding a common factor

FI	Criteria	Actual values
χ^2/df	χ^2/df<3	10.559
GFI	>0.9	0.355
AGFI	>0.9	0.559
RMR	<0.1	0.173
RMSEA	<0.05(<0.08acceptable)	0.179
NFI	>0.9	0.339
IFI	>0.9	0.362
CFI	>0.9	0.355

3.3. SEM test

1) Fitting evaluation

Based on the existing evaluation criteria of structural equation fitting index, each index value of the index is compared with the standard value, and the fitting test is carried out. According to Table 6, Chi-square degree of freedom ratio, RMR, RMSEA, IFI, CFI and other evaluation indicators are all within the acceptable range, and the fitting results are good, only NFI fails to reach the standard.[10]

Table 6 Structural equation index.

FI	Criteria	Actual values
χ^2/df	χ^2/df<3	1.886
GFI	>0.9	0.939
AGFI	>0.9	0.908
RMR	<0.1	0.051
RMSEA	<0.05(<0.08 acceptable)	0.054
NFI	>0.9	0.895
IFI	>0.9	0.948
CFI	>0.9	0.947

2) Path test

The overall path fitting table is shown in Table 7.

Table 7 Overal path fitting.

X	Y	Unstandardized Coefficients	S.E.	C.R.	P
Live online commenter's professionalism	**Perceived risk**	**0.308**	**0.093**	**3.307**	**0.001**
Live online comment quality	**Perceived risk**	**0.106**	**0.083**	**1.271**	***
Number of live online comments	**Perceived risk**	**0.127**	**0.094**	**1.351**	**0.177**
Perceived risk	**Purchase intention**	**0.271**	**0.078**	**3.456**	**0.001**
Live online commenter's professionalism	**Purchase intention**	**0.010**	**0.088**	**0.110**	**0.913**
Number of live online comments	**Purchase intention**	**0.206**	**0.085**	**2.411**	**0.016**
Number of live online comments	**Purchase intention**	**-0.055**	**0.095**	**-0.576**	**0.565**

3) Mediation Test

There are three methods to test the mediating variable,which are the causal steps approach,the coefficient product method and the improved causal step method. Since there is only one mediating variable in this research, the improved causal step regression test is adopted.

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By analyzing the regression of X to Y and X to M, the significance of coefficients c and a can be tested. Then, the significance of coefficients b and c' can be tested by testing the regression of X to Y after adding intermediate variables. Finally, the mediation effect test procedure proposed by scholars was verified, as shown in Figure 5(Wen Z, Hou J, Zhang L, 2005)

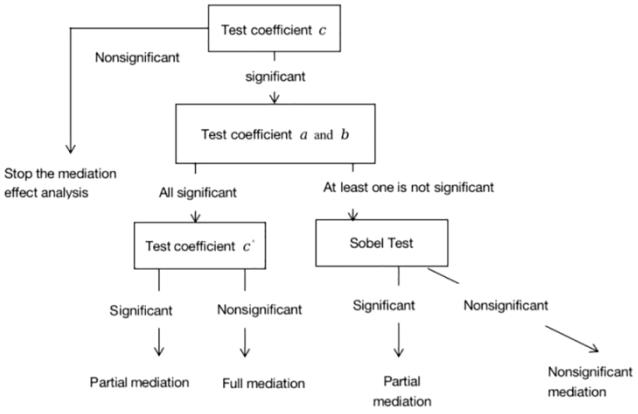

Fig.4 Flow chart of mediating effect test methods

According to the process, path analysis should be conducted on the model without intermediate variables to test coefficient c. The results are shown in Table8

Table 8 Path analysis result

X	Y	Unstandardized Coefficients	SE	Z(CR)	p
Live online commenter's professionalism	Purchase intention	0.087	0.073	1.193	0.023
Number of live online comments	Purchase intention	0.212	0.086	2.475	0.013
Live online comment quality	Purchase Intention	-0.003	0.093	-0.035	0.972

It can be concluded from Table 9 that the path coefficients of professionalism and quality of online comments of e-commerce live streaming online commenters are both greater than 0. Under such conditions, P values are both less than 0.05, which can be used for subsequent tests. At the same time, the path coefficient of the number of online comments on e-commerce live streaming is less than 0, indicating that there is no correlation between the number of online comments on e-commerce live streaming and consumers' purchase intention. The H3 is not valid, and according to the flow chart, the test coefficient c is not valid, so there is no need to do mediation effect analysis, and H4-3 is not valid.[11]

Then, coefficients a and b are tested in turn. According to Table 9, the path coefficient a of professionalism of online commenters of e-commerce live streaming on perceived risk is 0.308, p value is less than 0.01, and coefficient a is significant. The path coefficient of the intermediary variable perceived risk on consumers' purchase intention is greater than 0, p value is less than 0.05, and coefficient b is significant. If both coefficients a and b are significant, it is necessary to test the coefficient. As can be seen from the table, the coefficient value is 0.913, greater than 0.05, indicating that the coefficient is not significant. According to the flow chart, perceived risk has a complete mediating effect on reviewers' professionalism and purchase intention, and hypothesis H4-1 is true.

Table 9 Path analysis result

X	Y	Unstandardized Coefficients	S.E.	C.R.	P
Live online commenter's professionalism	**Perceived risk**	**0.308**	**0.093**	**3.307**	**0.001**
Live online comment quality	**Perceived risk**	**0.106**	**0.083**	**1.271**	***
Number of live online comments	**Perceived risk**	**0.127**	**0.094**	**1.351**	**0.177**
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Live online comment quality	**Purchase attention**	**0.206**	**0.085**	**2.411**	**0.016**
Number of live online comments	**Purchase attention**	**-0.055**	**0.095**	**-0.576**	**0.5653**

Consistent with the above test methods, the path coefficient a of e-commerce live online comment

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quality on perceived risk is greater than 0, p is less than 0.05, and coefficient a is significant. The path coefficient a of perceived risk on consumers' purchase intention is 0.271, and p is less than 0.05, indicating that coefficient b is also significant. Then, the test coefficient is also significant. Therefore, perceived risk has a partial mediating effect on the quality of online comments of e-commerce live broadcasting and purchase intention, and H4-2 is established. Therefore, the original model can be modified to obtain the existing model, as shown in Figure 6.

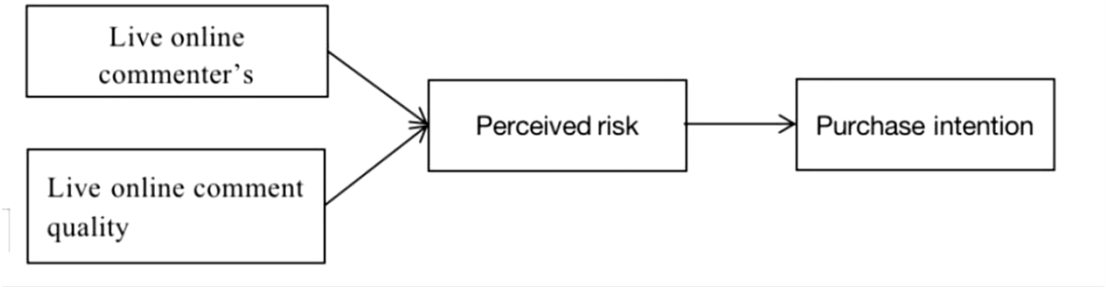

Fig. 5 Corrected model

4. Conclusions

Based on the influence model of SOR theory and sender's word of mouth, this study analyzes the influence of consumers' purchase intention from the dimension of online comments on e-commerce live streaming, and draws the following conclusions: (1) In the e-commerce live broadcast environment, consumers' purchase intention is influenced by live online comments. When consumers shop in the live broadcast room, they will pay attention to the content and commentators of live comments, thus being affected. (2) When consumers shop in the broadcast room, consumers' purchase intention will be affected by the professionalism of reviewers and the quality of online comments, but the number of online comments has no effect on it. Different from previous studies, the specific reason may be that the number of live comments changes in real time when users enter the live broadcast room to buy goods. Only during the playback of the live broadcast, the platform can accurately measure the total number of comments in the live broadcast, which makes consumers pay little attention to it. (3) In addition, both the professionalism of reviewers and the quality of reviews have an impact on perceived risk, and with the reduction of perceived risk, consumers' purchase intention will increase.[12]

This study also has certain limitations. (1) Insufficient objects of study: The objects of empirical study in this paper are mainly young people who have just graduated and entered the society and college students.[13] This group of young people has rich experience in using the Internet, and they are also fans of e-commerce live streaming apps.(2) In addition to the dimensions studied in this paper, there are also many perspectives to study online comments of e-commerce live broadcasting, such as the timeliness of comments. Unlike comments on e-commerce platforms, comments of different years can be consulted at any time on traditional e-commerce shopping platforms, while comments of live broadcasting are only limited to comments of this live broadcast. In addition, The participants of live online comments are all the users who enter the broadcast room, while the commenters of traditional e-commerce shopping platforms can only be consumers who have purchased goods. (3) Limitations of the model: In this process, it is only analyzed from the perspective of perceived risk unilaterally, but in combination with the actual situation, live online comments can also directly affect consumers' purchase intention, and the two are closely related, which indicates that in addition to the perceived risk as the intermediary variable, there are also other factors. Therefore, some other variables can also be added as intermediary variables for research, such as perceived trust, perceived usefulness, etc.

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