

# The Impact of Livestreamers in Livestreaming E-Commerce on Purchase Intention from the Perspective of Emotional Contagion

*Keywords:* Emotional contagion, Livestreamer, Emotional trust, Admiration

## 1. Introduction

Livestreaming e-commerce is growing rapidly (Greenwald Michelle, 2020). Livestreaming E-Commerce is promoting and selling goods through influencer streams on their own social media channels, most often housed on online shopping malls. It's like Home Shopping Network, but with charismatic, trendy anchors. It's also been described as part infomercial, part variety show, part group chat. The amount of goods sold through Livestreaming e-commerce are staggering, one livestreamer sold 15,000 lipsticks in 5 minutes (Teh Cheryl, 2020), and one livestreamer have a record-high audience of more than 37 million in a month, audience place orders worth millions of dollars (Bloomberg, 2020). Many companies value the enormous exposure, increased volume of visits and a large audience base of livestreamers in livestreaming e-commerce for product promotion (Chen et al., 2020). In fact, if livestream marketing only rely on their huge fan base for product promotion, it is not much different from the traditional marketing model. However, the product sales of livestreaming promoted by streamers are much higher than the latter (Zhou et al. 2019), and the reason and mechanism behind this phenomenon are still unclear.

There are limited efforts have been made to address this issue. Existing studies on the influence of livestreamers in livestreaming E-Commerce on consumers' purchasing behavior have mainly focused on the characteristics of livestreamers' information sources (Park et al., 2020), the performance features of livestreamers (Peng et al., 2020), and expanded from the perspectives of social motivation (Hilvert-Bruce et al., 2018) and quasi-social interaction (Sun et al., 2019).

This research considers that, unlike traditional marketing approach, real-time interaction is one of the prominent features of livestreaming e-commerce. In addition to conventional means of interactions such as product explanation, Q&A sessions and lottery draw of gifts to encourage consumers to purchase items, livestreamers through personality-saturated, persuasion-oriented performances would generate various emotions amongst audience, which in turn arouse, stimulate, lead and affect viewers' purchasing behavior, meanwhile, the other fellow audience's interactions with the livestreamers and audience often generate echoes and bring profound influences to the other audiences and consequently influence consumers' purchasing behavior. Thus, this study considers that the consumers purchase intentions is not merely infected by livestreamers in livestreaming e-commerce. The reason for this is that the livestreaming e-commerce has the characteristic of diversified multi-way (amongst anchors and viewers) real-time interaction. The audiences are interested in watching the livestreams and participates in interactive communication by sending a *screen bullet*. The *screen bullet* is referred to as the commentary subtitles sent and displayed simultaneously by audience when watching the livestreams. This feature allows audience to send real-time comments and feedback, often including emotion information, to be seen by the livestreamers as well as all other audience. As a result, it leads to that the audiences are not only

being infected by livestreamers directly, but also infected by the other audiences indirectly. Therefore, the research question of this study is that considering livestreamer and audiences of livestreaming e-commerce collectively as the subject of study, examine how do they affect consumers' willingness for purchase?

To address this question, this study applies the emotional contagion theory to address and explain how consumers are influenced and infected emotionally during livestreaming e-commerce directly and indirectly by streamers and other fellow audience, on their willingness to purchase the products promoted.

In this research, two studies have been conducted: Study 1, through a questionnaire based survey, examines and testifies if and how the consumers are emotionally infected by streamers in livestreams, in aspects of pleasant emotion, admiration, arousal emotion and emotional trust, thus enhancing their purchase intention. In Study 2 through collecting and analysing real data of online product searches and online product purchases while those products were promoted in livestreams, we examine and testify how the audiences are infected by other audiences through interactions including screen bullets along with streamers in term of pleasant emotion, admiration, arousal emotion and emotional trust with consideration of products in different categories, in term of their purchase behavior.

The main contributions of this study are as follows: firstly, this study applies and extends the theory of emotional contagion to the study the livestreaming e-commerce phenomenon, for understanding consumers' purchasing behavior, we have extended the understanding on how consumers are infected in term of their purchase intentions, where pleasure emotion, admiration emotion, arousal emotion and emotional trust are considered in the process of watching livestreams; Second, we take streamers and audiences as a whole, empirically examined and testifies the emotional effect of livestreams on consumers' purchase intention.

We begin by introducing an overview of studies that examine the emotional impacts of livestreaming e-commerce on consumers purchase decision making. Then, we develop a conceptual model of the links between employee deviance, customer repatronage intentions, and customer misbehaviour severity,

which incorporates past experience of customer misbehaviour.

After presenting Study 1 where a questionnaire based survey was conducted and the approach of structure equation modeling is used for data analysis, we present Study 2 the results of a study developed to analyse these associations.

We conclude with a discussion of the contributions and limitations of these studies.

## **2. Theoretical background and hypotheses development**

### *2.1. Livestreaming E-Commerce and Emotional Communication*

Livestreamers in livestreaming e-commerce interact with audiences in real time by streaming themselves playing video games, testing food or drinks, or drawing and so forth in real time (Hou et al., 2019). Audiences view the livestreams can also establish social communication with others by sharing and exchanging their opinions (Kim et al., 2020). This shows that the main difference compared to traditional media is that viewing a livestream allows for interactive participation in real-time with livestreamers and other audiences (Sun et al., 2019). Real-time participation satisfies

the audience's psychological needs for socialisation and entertainment, which leads to identification, attention, sharing, and purchasing behaviors (Park et al., 2020). Emotional communication refers to the expression, contagion and sharing of emotions among individuals or groups, which starts from the transmitter's emotions and is based on the evaluation of objective things and behavioral reactions, ultimately leading to emotional reactions and communication behaviors of both the transmitter and the receiver (Du et al., 2011). Environmental psychology considers that individuals' behaviors interact with the environment they belong to, and the virtual atmosphere of online shopping can somehow evoke consumers' emotional reactions and ultimately determine their behaviors (Sun et al., 2019). This study argues that the communication context and interactions of livestreams and audience stimulate viewers' emotional responses and purchasing behaviors, specifically, on the one hand, livestreamers would influence consumer purchasing behaviors by stimulating consumers' emotional responses, and on the other hand, screen bullet interactions between other audiences and livestreamers also stimulate consumers' emotional responses to change consumer purchasing behavior.

## *2.2. Emotional Contagion*

Emotions are essentially reactions to personal perceptions, which are intrinsically experiential in nature; at the same time, it is also a social phenomenon that is externally manifest and can be expressed through various form of expressions, gestures, words, pictures, and music, and so forth (Du et al., 2011). This display of emotion can be widely presented in interpersonal interactions and can have an impact on others, i.e., individuals can feel the emotions of others and react to others' emotions (Fan et al., 2017). Emotional contagion is "the process by which individuals or groups are infected, consciously or unconsciously, by the emotional states and behavioral attitudes of other individuals or groups" (Du et al., 2011). People automatically, instantly and continuously imitate others' facial expressions, voices, postures, movements and behaviors, and so forth during social interactions and tend to capture others' emotions at all times; the process is known as emotional contagion (Barsade et al., 2018).

With the enrichment of the emotional contagion theory, its implicational domain has expanded from the initial mental health to service and marketing, and related research has focused on emotional contagion between service personnel and customers, and a few scholars have studied emotional contagion among customers. Even among customers without direct interaction, the emotions of other customers can have an impact on customer mood and repurchase intention (Coviello et al., 2014). Nevertheless, it is clear that most of the research in the marketing field on emotional contagion has focused on offline services between "customer-employees" and less explored the context of online shopping emotions. This may be due to the fact that there are more opportunities for face-to-face communication and interaction between offline shopping "customer-employees" than online shopping, and emotional contagion between them is relatively straightforward to observe and measure. However, as key conversations and tasks increasingly take place in virtual environments, scholars have begun to explore whether emotional contagion can occur in the absence of physical location (in many cases, through text-based interactions alone). While research in this area is still in its infancy, existing studies suggest that emotions can actually be transmitted virtually between individuals or teams and, more broadly, across social networking platforms (Cheshin et al., 2011; Del Vicario et al., 2016; Ferrara and Yang, 2015. Kramer et al., 2014).

It can be seen that, along with the rise of livestreaming e-commerce, consumers can share

information and express their emotions with livestreamers in livestreaming broadcast platforms (Kramer et al., 2014) and carry out a series of interactive activities, which provides an opportunity and condition to explore the emotional contagion between livestreamers and consumers in online shopping context. Therefore, this study attempts to explore the influence of livestreamers on consumers' purchasing behavior, and applies the theory of "emotional contagion" to provide understandings in this context. On the other hand, consumers may also be indirectly infected by other audiences who have been emotionally infected by the livestreaming broadcast through screen bullet interactions, all together it eventually may make consumers temporarily enter the impulsive state and increase their purchase intention.

### *2.3. Pleasant Emotion*

Consumer emotions can be categorized into several basic dimensions. Pleasure, arousal, and dominance are the three bipolar dimensions of emotion proposed (Russell, 1980). These three dimensions have been modified several times, and much of the literature suggests that the two basic dimensions of pleasure and arousal together constitute the "core emotion" (Russell et al., 1989), and that the dominance dimension can be removed (Donovan et al., 1994), leaving the remaining two dimensions sufficient to represent the emotional response to external stimuli (Ladhari, 2007, Cheng et al.2009) showed that pleasantness and arousal were good proxies for context-induced affective states, whereas dominance was found to have the lowest predictive value in similar contexts. The pleasant dimension refers to the extent to which people feel good, happy, content and pleased in the context (Cheng et al., 2009). When consumers feel pleasant in a store environment, they increase their willingness to purchase a product (Pihlström and Brush, 2008). In this study, it is believed that, on the one hand, when livestreamers describe and present their products through friendly, warm, nice and/or humorous language and demeanor during livestreaming, pleasant emotion will be developed amongst consumers (direct contagion). On the other hand, the audience watching livestreaming will respond with various positive responses through screen bullets and will also generate pleasant emotion in audience (indirect contagion). All together pleasant emotions will be formed amongst audience with the livestreamers due the enjoyment experience in livestreaming, the pleasant emotion will enhance consumers' purchase intention. Based on this, hypotheses H1a and H1b are proposed.

**H1a:** Consumers' pleasant emotions be affected by livestreamers will positively affect consumers' purchase intentions.

**H1b:** Consumers' pleasant emotions be affected by other audience will positively affect consumers' purchase intentions.

### *2.4. Arousal Emotion*

The arousal dimension refers to the extent to which people feel excited, alert, stimulated, awakened, and positive in a situation (Russell, 1980). Pleasant emotions obtained by consumers in livestreaming are referred to as the extent to which a person feels good, happy, joyful, and satisfied in livestreaming and therefore enhance their product purchasing behavior. Arousal emotion of viewers in livestreaming is referred to as the degree to which a person feels stimulated, positive and alert in livestreaming, it positively affects consumers' purchase intentions (Monsuwé et al., 2004). Previous studies on store environments have found that stores enhance consumers' purchase

intentions by enhancing consumers' arousal emotions through scenography (Baker et al., 1992; Oliver et al., 1997). The stimulation of retail environment can stimulate arousal emotions and increase consumers' willingness to interact with the store environment, thus enhancing their purchase intention (Bues M, et al., 2017). This study argues that, on the one hand, consumers are in a state of excitement due to the curiosity triggered the livestreamers in livestreaming e-commerce. The livestreamers convey arousal emotions to consumers through the presentations (direct effect). Also, the screen bullets sent by audience in the livestreaming will further develop the mood of arousal emotion (indirect effect). As a result, consumers will have arousal emotions, which will enhance their purchase intention. Based on this, hypotheses H2a and H2b are proposed.

**H2a:** Consumers' arousal emotions be affected by anchor will positively affect consumers' purchase intentions.

**H2b:** Consumers' arousal emotions be affected by other audience will positively affect consumers' purchase intentions.

### *2.5. Emotional Trust*

Affective trust is based on mutual interaction and attraction, deepened by frequent communication and exchange between individuals over time, and manifests concern for the welfare of the trusted person (Mian et al., 2013). Emotional trust is an emotion-based confidence formed by the trusting party with the trusted party, showing concern for the other party's welfare, taking full account of the other party's purpose and intentions, and relying on good communication (Chua et al., 2008). Consumers' perceived trust in online retailers affects affective trust, which in turn enhances purchase intentions (Zhang et al., 2014). Consumers have emotional trust in the brand community and increase the brand purchase intention (Habibi et al., 2014). With consideration of livestreaming e-commerce, this study argues that during consumers' viewing of livestreamers' performances, on the one hand, livestreamers will pursuit to gain instant favor from viewers, which leads to emotional trust (direct effect). On the other hand, the audience watching livestreamers' performances will further strengthen the relationship with the livestreamers through screen bullets shared amongst audience, which also increase interaction and participation, and enhance emotional trust (indirect effect). As a result, consumers will develop emotional trust, which will enhance consumers' purchase intention. Based on this, hypotheses H3a and H3b are proposed.

**H3a:** Consumers' emotional trust be affected by anchor will positively affect consumers' purchase intentions.

**H3b:** Consumers' emotional trust be affected by other audience will positively affect consumers' purchase intentions.

### *2.6. Admiration*

Admiration belongs to the category of positive psychology and refers to a high level of respect for outstanding others or role models (Becker and Luthar, 2007) and is a positive emotional feeling that people experience when they see extraordinary abilities or virtuous behavior in others (Immordino-Yang et al., 2009). Existing studies on celebrity admiration and leadership admiration show that admiration is an important factor in attracting loyal fans and mass followers (Pimental and Reynolds, 2004). Fans' fanaticism and obsession with celebrities largely stems from their

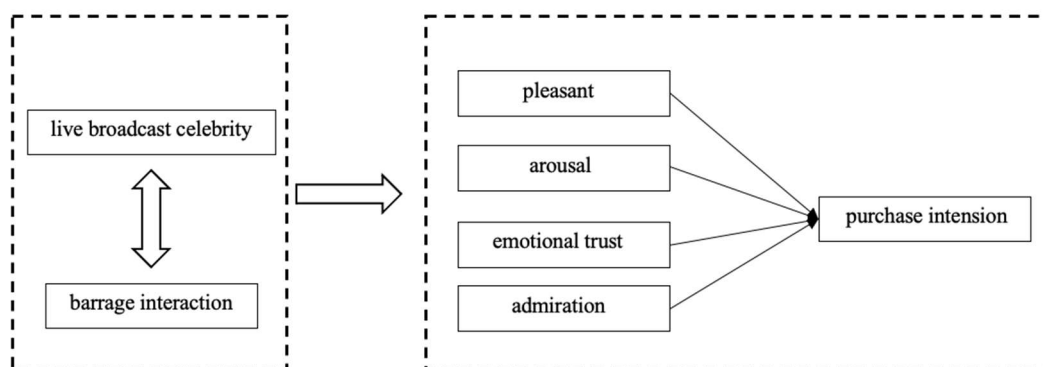
admiration for them (Wohlfeil and Whelan, 2012), and admiration for celebrities motivates fans to purchase products endorsed by celebrities (Peng et al., 2020). Admired brands attract more purchases, increased consumer attitudes and behavioral intentions, and greater engagement (Willems et al. 2019), connection, and loyalty (Aaker et al., 2012; Trivedi and Sama., 2020). This study argues that during consumers' viewing of livestreamers' performance, on the one hand, creates emotional empathy and thus admiration (direct effect). On the other hand, the audience watching the livestreams will express their admiration for livestreamers through screen bullet, which makes them resonate emotionally and further enhances the admiration emotion (indirect effect). Thus, admiration can enhance the psychological connection with online celebrities and contribute to their purchase intention for the products recommended on site, based on which hypotheses H4a and H4b are proposed

**H4a:** Consumers' admiration affected by anchor will positively affect consumers' purchase intentions.

**H4b:** Consumers' admiration be affected by other audience will positively affect consumers' purchase intentions.

The framework is shown in Figure 1.

**Fig. 1. The framework.**



## 2.7. Research Overview

The emotional contagion theory has been applied for reasoning and understanding that consumers who watch livestreamers' performances and other audiences' screen bullet interactions are emotionally infected by livestreamers themselves and other fellow audiences, it is hypothesised that those activities and experience would stimulate consumers' desire to purchase. In this research, two studies (Study 1, and Study 2) have been conducted to examine and testify those hypostases. Study 1 is designed to examine the emotional factors associated with livestreamings would affect consumers' willingness to purchase products (direct contagion effect); and in Study 2, since the emotional contagion triggered by other livestream viewers through screen bullet is difficult to measure in the form of self-reporting, we study screen bullet data of livestreaming e-commerce, and examine how audiences are infected in term of purchase intention by screen bullets interactions by audiences along with livestramers when different categories of products (cosmetics, clothes, and

food) were presented livestreaming (indirect contagion effect). Study 1 and Study 2 are introduced in the following section.

However, in addition to the direct emotional contagion from the livestreamers, consumers will also receive indirect emotional contagion from other audiences through the medium of screen bullet who also watching the livestream. Therefore, we will use screen bullet crawlers to collect related data and text analysis methods in Study 2 to verify that the emotions from other audiences watching livestreamers in livestream also infect consumers with increased purchase intentions.

### 3. Study 1

Study 1 aims to examine whether livestreamers' performances infect consumers with pleasant emotion, admiration, arousal emotion and emotional trust, which in turn increase consumers' willingness to purchase products recommended by livestreamers.

#### 3.1. Experimental design

##### (1) Sample and data collection

In this study, a survey approach is utilised where a questionnaire has been distributed, and we set up a virtual scenario with reference to Park et al. (2020), and participants read the virtual scenario before filling out the questionnaire. In order to find suitable participants, 600 regular livestream viewers from the offline fan community of the livestreaming e-commerce platform (Douyu)<sup>1</sup>, who had previous purchase experience, were randomly recruited for this study. The text of the virtual scenario reads, "Please imagine a scenario in which you are planning to buy a pair of sports shoes, and you have searched it for a long time in online stores but have not found one you like, and at this moment, one of your favorite livestreamers with insightful information and personal experience of the product happens to promote a type of sports shoes." The participants continued to fill out the questionnaire after reading the scenario materials. For total of 600 questionnaires, there are 521 questionnaires were returned, and the information of the participants (survey subjects) is shown in Table 1. After excluding incomplete returned questionnaires, there were 496 valid, with an effective rate of 82.6%. To check whether there was response bias in the sample, an independent sample t-test was conducted on the individual descriptive statistics of the sample, and the results showed that  $t > 0.05$ , indicating that there were no significant differences in the covariates (gender, Internet age, education, income, and job type), indicating that there was no response bias in the questionnaire sample.

**Table 1** Descriptive statistics of the study sample

Sample Characteristics	Classification Criteria	Sample		Sample Characteristics	Classification Criteria	Sample	
		No.	Percentage %			No.	Percentage %
Gender	Male	225	45.4	Income	1-3000 Yuan	71	14.3

<sup>1</sup> [www.douyou.com](http://www.douyou.com)

Internet age	Female	271	54.6	Job Type	3000-6000 Yuan	169	34.0
	Less than 5 Years	54	11.0		6000-9000 Yuan	144	29.2
	5-10 Years	66	13.3		9000+ Yuan	112	22.5
	10-15 Years	200	40.3		Students	168	33.9
	15+ Years	176	35.4		Teachers	37	7.5
Highest Education	College	89	18.0	Civil Servants	25	5.0	
	Undergraduate	237	47.8	Enterprises and Institutions	19	3.8	
	Postgraduate	93	18.7	Freelancers	247	49.8	
	Ph.D.	77	15.5				

## (2) Measurement Tools

To ensure the reliability and validity of the questionnaire, a more mature scale was used in this study, and modifications were made to the scale taking into account the context of this experiment. Pleasant emotion was referred to the study of Cheng et al. (2009) and contained four question items (Cronbach's  $\alpha=0.847$ ). The measure of arousal emotion was synthesized from Cheng et al.'s (2009) scale and included a total of 3 items (Cronbach's  $\alpha=0.843$ ); the measure of emotional trust was synthesized from Chua et al.'s (2008) scale and included a total of 3 items (Cronbach's  $\alpha=0.892$ ); the measure of admiration was synthesized from Becker and Luthar's (2007) scale and included a total of 3 items (Cronbach's  $\alpha=0.866$ ); purchase intentions were measured using a scale developed by Dodds (1991) with 3 items (Cronbach's  $\alpha=0.748$ ). The specific scale items are shown in Table 2. All four variables were measured using a 7-point Likert scale, with 1 indicating "completely disagree" and 7 indicating "completely agree". In order to avoid the influence of other control variables, gender, Internet age, education, income, and job type were selected as covariates in this study, with gender and job type treated as dummy variables and other variables treated as continuous variables.

Please refer to Table 2 for the scale question items and Table 3 for descriptive statistics.



**Table 2**

Measurement variables	Measurement question items	References	Load factor	Scale Reliability	AVE	CR
Pleasant Emotion	You feel pleased to be emotionally infected by Online celebrities during livestream	Cheng et al (2009)	0.748	Cronbach's $\alpha=0.847$	0.583	0.848
	You feel satisfied to be emotionally infected by Online celebrities during livestream		0.808			
	You feel relaxed to be emotionally infected by Online celebrities during livestream		0.773			
	You feel happiness to be emotionally infected by Online celebrities during livestream		0.722			
Arousal Emotion	You feel excited to be emotionally infected by Online celebrities during livestream	Cheng et al(2009)	0.763	Cronbach's $\alpha=0.843$	0.644	0.844
	You feel thrilled to be emotionally infected by Online celebrities during livestream		0.804			
Emotional Trust	You feel nervous to be emotionally infected by Online celebrities during livestream	Chua et al (2008)	0.841	Cronbach's $\alpha=0.807$	0.584	0.808
	You will feel that the content of livestream is credible when you are emotionally affected by Online celebrities		0.728			
	You will feel that the products recommended by the Online celebrities are reliable when you are emotionally affected by them during the livestream		0.795			
	You will feel that the Online celebrities are trustworthy when you are emotionally infected by them in the process of watching livestream		0.768			
Admiration	You will feel that the Online celebrities have excellent qualities when you are emotionally infected by them in the process of watching livestream	Becker and Luthar (2007)	0.751	Cronbach's $\alpha=0.836$	0.562	0.837
	You will feel that the Online celebrities are worthy of your learning and recognition when you are emotionally infected by them in the process of watching livestream		0.754			
	You will feel that you can relate to the live content of the Online celebrities when you are emotionally infected by them in the process of watching livestream		0.713			
	You will pay attention to the latest developments of the Online celebrities in the process of watching them live		0.778			
Purchase Intention	You are very likely to consider buying products recommended by Online celebrities	Dodds (1991)	0.693	Cronbach's $\alpha=0.748$	0.501	0.748
	You are willing to buy products recommended by Online celebrities		0.699			
	You would recommend products recommended by Online celebrities to others		0.723			

**Table 2** Pearson correlation and the square root of ave

	Mean	SD	JO	AR	AD	TR	PI
JO	4.26	1.90	<b>.764</b>				
AR	4.70	2.05	.102	<b>.802</b>			
AD	4.20	1.83	.154	.045	<b>.749</b>		
TR	4.45	1.97	.148	.122	.160	<b>.764</b>	
PI	5.21	1.70	.375	.229	.306	.233	<b>.705</b>

Note: JO-Pleasure emotion; AR-Arouse emotions; AD- Admiration; TR- Emotional trust; PI- Purchase intention, The bold numbers on the diagonal are the square root of AVE of the corresponding variable

### 3.2. Data Analysis

#### (1) Reliability & Validity Analysis

In this study, AMOS 17.0 was used to test the discriminant and convergent validity among the model variables, five of which (pleasant emotion, arousal emotion, emotional trust, admiration, and purchase intention) were subjected to confirmatory factor analysis to detect the discriminant validity among the variables by comparing the strengths and weaknesses of the fit indices of the hypothetical and competing models. From the results of the analysis in Table 4 it was found that the fit indices of the five-factor model ( $\chi^2 = 117.437$ ,  $df = 109$ ,  $TLI = 0.997$ ,  $CFI = 0.997$ ,  $RMSEA = 0.012$ ) were significantly better than the other competing models. Also, the loading factors of each construct observed variable in the model were all bigger than 0.5, with  $CR > 0.7$  and  $AVE > 0.5$ , which is shown in Table 2 and Table 3.

**Table 4**

Model	$\chi^2$	df	$\Delta\chi^2$	TLI	CFI	RMSRA
Five factor model (hypothesis model)	117.437	109	—	.997	.997	.012
Four factor model	258.586	112	485.22**	.854	.798	.061
Three factor model	455.587	113	755.45**	.751	.712	.077
Two factor model	855.228	114	897.25**	.657	.651	.112
Single factor model	1113.586	115	1385.22**	.554	.604	.135

Four factor model: the pleasant emotion and arousal emotion are combined into one factor. Three factor model: pleasure emotion, arousal emotion and admiration emotion were combined into one factor. Two factor model: pleasant emotion, arousal emotion, admiration emotion and emotional trust are combined into one factor. Single factor model: all variables are combined into one factor.

## (2) Test Results

A structural equation model was constructed using AMOS 17.0 to test the proposed hypotheses. First, the model was tested by the chi-square/degree of freedom  $\frac{\chi^2}{df} = 1.08$ , the superiority fit index GFI = 0.97, the adjusted superiority fit index AGFI = 0.963, the canonical fit index NFI = 0.964, the non-normal fit index TLI = 0.997, the comparative fit index CFI = 0.997, and the root mean square error of approximation RMSEA = 0.012. These indicators were tested for the fit of the model, and the sample fit indicators  $\frac{\chi^2}{df}$  were between 1-3, GFI, AGFI, NFI, TLI and CFI were greater than 0.85, RMSEA was less than 0.08, indicating that the model fit of the study was good, and further testing of the hypothesis was based mainly on each standardized path coefficient in the model.

**Table 5** Model path coefficients

Pathway	Relation	Non-standardized coefficient	Standardization coefficient	P-value	Result
H1a: Pleasant emotion → purchase intention	+	0.309	0.370	<0.001	Support
H2a: Arousal emotion → purchase intention	+	0.160	0.201	<0.001	Support
H3a: Emotional trust → purchase intention	+	0.123	0.143	0.007	Support
H4a: Admiration → purchase intention	+	0.245	0.284	<0.001	Support

Based on the test results of each standardized path coefficient in the model Table 5 shows that pleasant emotion has a significant effect on consumer purchase intention ( $\beta=0.370$ ,  $p<0.001$ ), arousal emotion has a significant effect on consumer purchase intention ( $\beta=0.201$ ,  $p<0.001$ ), emotional trust has a significant effect on consumer purchase intention ( $\beta=0.143$ ,  $p=0.007$ ), admiration has a significant effect on consumer purchase intention ( $\beta=0.284$ ,  $p<0.001$ ). Therefore, hypotheses H1a, H2a, H3a and H4a are validated.

Therefore, this study finds that livestreamers in livestream are able to infect viewers' emotions by purposefully planning, and controlling their emotional expressions, and that emotionally infected consumers engaging in livestream interactions and are able to enhance their purchase intentions. This finding also extends the traditional theory of emotional contagion, which was originally proposed by Hatfield and Cacioppo (1994) to address the dynamic communication process between two face-to-face behavior entities, but the social presence generated by livestream plays an important role in the formation of behavioral intentions.

Specifically, first, livestreamers in livestream need to not only introduce the products to be sold comprehensively, but also dynamically present marketing content and image information to audiences through product explanation, testing, evaluation in delightful ways, so that consumers are

infected by their pleasant emotions and thus trigger their attention to the products. Secondly, in livestream, livestreamers will use incentives such as limited-time purchases and gift distributions, which help stimulate consumers to maintain a high level of attention and interest in the preferential goods, with stimulated arousal emotions and they make purchase decisions quickly under the established time constraints. Thirdly, in livestreaming e-commerce, the unique features of livestreamers such as appearance, language, personality, talent and preference of netizens are regarded as opinion leaders and idols by some consumers. These features will inspire consumers' admiration, which is transmitted to the recognition of the product advertised by the livestreamer, and thus increases purchase intention. This finding is also consistent with the findings of traditional celebrity advertising endorsements (Wohlfeil and Whelan, 2012; Peng et al., 2020). Fourth, consumers would make purchase decisions under the premise of limited rationality, and they tend to generate transactional behavior based on trust (Mian et al., 2013).

The detailed product descriptions and marketing interactions of livestreamer in livestreams convey emotional trust, while eye-catching marketing contents, powerful online promotions, unique explanations and recommendations, and warm communication responses show that the progression of both parties from "meeting" to "being familiar". The process of "meeting" to "being familiar" is a step-by-step progression process that infects consumers with emotional trust, leading to trust in livestreamers and their recommended products, and then amplifies their purchase intentions. Thus, based on the perspective of emotional contagion, the emotions of the livestreamers can be transmitted to consumers through the medium of livestreams, and consumers are infected with emotions, which influence them make purchase decisions.

#### **4. Study 2**

Study 2 aims to examine that the emotions of other audiences watching the livestreamers in livestream also infect consumers, generating pleasant emotion, arousal emotion, emotional trust and admiration, which in turn increase consumers' willingness to purchase products recommended by the livestreamers. In the first stage, we analyse the crawled screen bullets, including the lexical classification of the screen bullets and statistical analysis of consumer, emotion and product related information. In the second stage, we construct an econometric model to investigate the influence of other audiences' emotions and response on consumers' product search and purchase.

There are various product categories sold in livestreaming e-commerce, but each livestreamer tends to be mainly good at selling one category of products. According to the Taobao Live Data Rankings (Taobao Live Data Rankings 2020) released in the first quarter of 2019, the top three types of goods sold in livestream were cosmetics, clothes, and food. Previous studies have found that because the features of the three product categories are not the same (Moore and Konrath, 2015; Souiden and Diagne, 2009; Moody et al., 2010), the degree to which they are affected by consumer sentiment can be vary. Therefore, in this study, those three categories of products were selected for investigation. In each category, one leading livestreamer was selected (SEO China Agency, 2020).

The reason of screen bullet crawler and then make regression is that, on the one hand, the emotional infection of other audiences to consumers is transmitted through the form of barrage reading by consumers; on the other hand, because the emotional infection of other audiences to consumers is often just because a barrage of two sentences causes the instantaneous state of

consumers' subconsciousness, it is difficult to report through consumers' self-way of measurement.

#### *4.1. Data Source*

The data used in this study are real-time searching records and sales records of the Taobao online stores (<https://www.taobao.com>) of the livestream during April 2019 to April 2020 in cooperation with Zhi Gua Data (Zhi Gua Data, 2020). As discussed early, in this study, three categories of products, cosmetics, clothes and food, were selected.

The specific process is as follows: in order to avoid the interference triggered by different platforms of the same category of products, we selected each category from the same livestream platform for data acquisition; secondly. In order to control the consistency of the collection time, we selected the time point when the target livestreamers were conducting livestreams, and the final number of days for screen bullet data collection was 288 days, with a total of 1456,372 useful screen bullets collected. For the leading livestreamer in the cosmetics category, 513,543 screen bullets were collected in total. For the leading livestreamer in clothes category, a total of 499,289 screen bullets were crawled. For the leading livestreamer in food category, 443,540 screen bullets were collected.

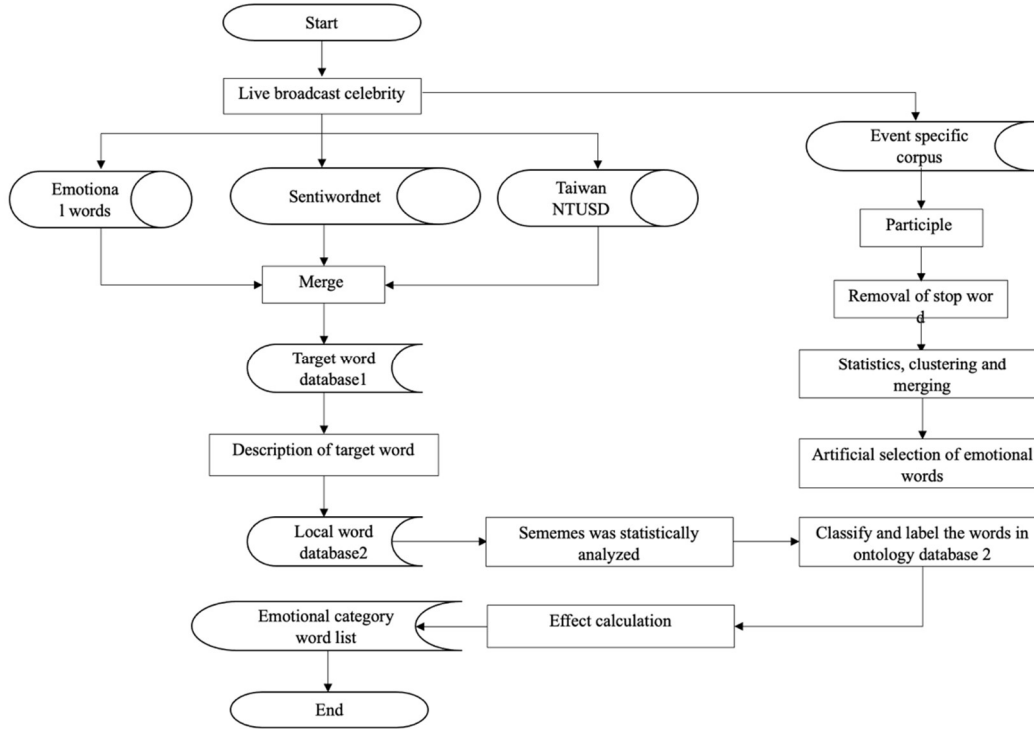
#### *4.2. Text Analysis*

Firstly, we pre-process the screen bullet data collected using web data crawlers, filter out the screen bullet that have no practical meaning, and filter out the screen bullet whose text is meaningless or containing noisy data. Also, screen bullets that are not relevant to the products to be sold. Once the pre-process is completed, it enters the parsing stage which involves separating the pieces of a screen bullet into a data structure that other routines can process. A word/phrases process tool developed by ICTCLAS (Lu et al., 2013) was modified for screen bullet data process in our study. Secondly, by compiling a marketing lexicon of livestream emotion characteristics and product characteristics, the number of mentions and percentage and other statistics of the bullet screen were calculated. Finally, syntax check and semantic check will be done. All words/phrases are further compared to the marketing lexicon, categorized into the corresponding marketing lexicon's characteristic categories, and the final statistical analyses will be performed.

#### *4.3. Marketing Lexicon Compilation*

The existing emotion lexicon construction considers emotional polarity and intensity, but lacks considerations on emotions in relation to marketing effects, this issue has been addressed in this study, where the aspect of marketing effects linked to emotions has been included in the lexicon construction, the following process is illustrated in Figure 2:

Fig. 2.



In the first step, an expert system was developed to label the marketing effect of emotions on the basis of the University of Technology Emotional Vocabulary Ontology Database (Dalian University of Technology Emotional Vocabulary Ontology Database, 2020), which contains 7 major categories and 21 subcategories, with a total of 27,467 words and phrases. In the second step, a baseline emotion marketing effect lexicon was developed by integrating and synthesizing a positive and negative word usage lexicon, the CNKI polarity emotion word lexicon (CNKI, 2020), a sentiment dictionary (NTUSD, 2020), as well as an ontology of synonyms to expand emotions related words. Finally, applying the baseline emotion marketing effect lexicon to analyse the screen bullets data files collected by using Web data crawler from livestreams in livestreaming e-commerce platform, where the unknown words and phrases were classified by Pointwise Mutual Information (PMI), as a result the base (Emotional Vocabulary Ontology Database) is further expanded.

In the experiment, initially the semantically clear words were manually selected as the baseline emotional marketing effect words. Then, equations (1) and (2) were used to calculate and categorize them.

$$S(w) = \frac{\sum_{i=1}^m \log_2 \frac{p(w, x_i)}{p(w)p(x_i)}}{m} \quad (1)$$

$$S(w) = \frac{\sum_{i=1}^m \log_2 \frac{p(w, y_i)}{p(w)p(y_i)}}{m} \quad (2)$$

In the sentiment word categorization formula  $S(w)$ ,  $m$  and  $n$  represent the number of positive and negative baseline words, respectively,  $p(w)$  is the probability size of the occurrence of unidentified words,  $p(x_i)$  and  $p(y_i)$  represent the probability size of the occurrence of positive and negative baseline words, respectively,  $p(w, x_i)$  represents the probability distribution of the co-occurrence of unidentified words as well as positive baseline words, and  $p(w, y_i)$  is the probability distribution of the co-occurrence of unidentified words with negative words. The final obtained marketing lexicon is shown in Table 6 below.

**Table 6**

Marketing Lexicon Dimensions	Words that correspond to the corresponding dimensions of the marketing lexicon
JO	Delighted, cheerful, joy, smiling, hi, beautiful, happy, pleased.....
AR	Flustered, panic, overwhelmed, frazzled, miracle, wow, goddammit, eye-opening.....
TR	useful, good, bought, paragraph, buy, screenshot, cheat, counter, genuine, really, sure, trust, convinced, believe, trustworthy, reliable.....
AD	Good-looking, praise, beautiful, face, wow, nice, handsome, cute, lady, fan, good show, awesome, invincible, good skills, good player 6 6666.....
Perceived Quality	Good quality, very soft, rough, nice.....
Perceived Value	Good value, high price, expensive.....
Product Style	Size, color, big.....

#### 4.4. Data Analysis

The data analysis also contains two parts: the first part being the lexical classification and statistical analysis of the overall crawled screen bullets; the second part being the analysis of the empirical results of the econometric model.

##### (1) Text Analysis Results

The percentage analysis of 1456,372 useful screen bullet comments shows that 99,033 (68.0%) of the consumer comments involve emotions, which far exceeds the 466,039 comments (32.0%) on product features. In terms of emotions, consumers in the comments focused on the admiration towards the online celebrities in livestream (31.30%). In terms of product features, consumers in comments focused on the perceived value of the products (48.50%). By looking at the total percentage of the number of consumer concerns, it shows that consumers' concern about the products recommended by livestream Online celebrities depends more on emotions, and the percentage distribution of the consumer concerns is shown in Table 7.

**Table 7** Percentage Distribution of Consumer Concerns

Online celebrities Emotional Characteristics (990333, 68%)	Online celebrities Product Characteristics (466039, 32%)
---	---

Indicators	JO	AR	AD	TR	Perceived Quality	Perceived Value	Product Style
No. of being mentioned	181528	281255	309974	217576	117442	226029	122568
Percentage of being mentioned	18.33%	28.41%	31.30%	21.96%	25.20%	48.50%	26.30%

The text analysis verified that consumers' attention to online celebrities' products mainly depends on emotional nature, and product characteristics play a secondary role in this process; therefore, in the econometric model, the emotion of the audience watching Livestreamer livestream is studied as the independent variable in this study, while product characteristics are used as control variables for model construction.

#### 4.5. Econometric Model Construction & Variable Definition

The emotions of other audiences watching the livestreamer in livestreams also infect consumers, generating pleasant emotions, arousal emotions, emotional trust and admiration, which in turn enhance consumers' willingness to purchase products recommended by the livestreamer. Therefore, in the modeling process, the emotion variables of other audiences watching the same livestream, the number of consumer searches and the number of products purchased need to be defined.

##### (1) Emotions of Audience Watching Livestreamer Livestream //

The livestreamer representatives of three product types (cosmetics, clothes and food) were selected as the research objects, and the PYTHON data crawler was used to capture the Livestreamer live screen bullet from each Livestreamer's corresponding livestream platform website. To ensure the uniformity of data search time, the crawling time was chosen to capture the livestream screen bullet during the same livestream time for each Livestreamer. After that, the live screen bullet of three different product types were analyzed separately. The words corresponding to different screen bullet statements in the text were divided into the corresponding emotional dimensions, and the daily total number of words in each sub-dimension was counted (the process was the same as the text analysis process in the first stage, and the difference was that the process analyzed the screen bullet crawled by the three types of Online celebrities separately). The four sub-dimensions of this study are pleasant emotion (JO), arousal emotion (AR), emotional trust (TR) and admiration (AD).

##### (2) Number of Searches and Purchases of Products

In this study, the search and purchase volumes about the recommended products were provided by Zhi Gua data (Zhi Gua Data, 2020) for three categories of products which were promoted during livestreams, the starting data is when the recommended products were promoted at the livestream sessions start, and the end time is of the livestream for that product ends. The search and purchase volumes of each of the recommended product during this period was observed and recorded. //

It is expected that, through their demonstrations and introductions during the livestream, online celebrities of the three selected products hope that the consumers watching the livestream will visit the online stores and purchase the corresponding products. Therefore, this study starts from the beginning of screen bullet crawling and counts for the number of online searches for products and the purchase made by consumers while watching the livestream. To ensure that the number of searches and purchases are indeed triggered by consumers watching the livestream, we match the



livestream time with the search and purchase time provided by Zhi Gua. The number of searches for the product is defined as SN. Similarly, tracking the search page yields whether the consumer eventually purchased the product, and thus the purchase volume of the product is counted, defined as PN.

This study uses the dummy variable  $I_j$  to indicate the product type, which is used to distinguish the influence of different types of emotions on consumers' product search behavior,  $J=0,1,2$ ,  $I_0$  is for cosmetics category Livestreamer in livestream,  $I_1$  for clothes category Livestreamer in livestream, and  $I_2$  for food category Livestreamer in livestream. When  $I_0=1, I_1=0, I_2=0$ , the dependent variables are the search behavior and purchase behavior for the cosmetics product with livestreamer in livestream;  $I_0=0, I_1=1, I_2=0$ , the dependent variables are the search behavior and purchase behavior of clothes class livestream Livestreamer;  $I_0=0, I_1=0, I_2=1$ , the dependent variables are the search behavior and purchase behavior of food class livestream Livestreamer. There is no case that  $I_0, I_1$ , and  $I_2$  are 1 at the same time or two of them are 1.

According to the lexical analysis of the crawled screen bullet, the filtered screen bullet includes two major parts: the emotional characteristics of the livestream audience and product characteristics. The lexical ratio analysis reveals that compared with the emotional characteristics, the product characteristics are not the primary reason for consumers to pay attention to the products, but only play a secondary role in the influence process. Therefore, product characteristics are considered as control variables in this study. According to the screen bullet subscripts and marketing lexicon, it is known that product value and product style can be characterized by product price and product category, while perceived quality depends on consumers' subjective feelings and cannot be expressed by objective data. Therefore, this study adds product price (PP) as a control variable in the model for research, and the meanings of the variables are shown in Table 8.

**Table 8** Meaning of measured variables

Variable Type	Variables	Meaning of Variables
Dependent variable	SN	Search number for products during the data collection period
	PN	Purchas number of products during the data collection period
Independent variable	$I_j$	Livestreamer type, for cosmetics category, $j$ takes the value of 0, for clothes category, $j$ takes the value of 1, for food category, $j$ takes the value of 2
	JO	Number of pleasant emotion words
	AR	Number of Arousal emotion words
	AD	Number of Admiration words
Controlled Variables	TR	Number of Emotional trust words
	PP	Price of products searched and purchased by consumers

Among the constructed variables, the dependent, independent and control variables all involve two attributes, i.e., time and website category (the online platform trading website where the online store of the Livestreamer product is located). All variables are standardized so that the dependent, independent and control variables are left with a time dimension, and a more robust result can be obtained by using the least squares method for regression.

In summary, 2 models are established in this study.

Model 1: Livestreamer recommended product search model

$$SN = C_0 + C_1 + C_2 + \sum_{j=0}^2 \sigma_{11j} JO \cdot I_j + \sum_{j=0}^2 \sigma_{12j} AR \cdot I_j + \sum_{j=0}^2 \sigma_{13} AD \cdot I_j +$$

$$\sum_{j=0}^2 \sigma_{14j} TR \cdot I_j + \lambda_{11} PP + \varepsilon_1 \quad (1)$$

Model 2: Livestreamer recommended product purchase model

$$PN = C_0 + C_1 + C_2 + \sum_{j=0}^2 \sigma_{21j} JO \cdot I_j + \sum_{j=0}^2 \sigma_{22} AR \cdot I_j + \sum_{j=0}^2 \sigma_{23j} AD \cdot I_j + \sum_{j=0}^2 \sigma_{24j} TR \cdot I_j + \lambda_{21} PP + \varepsilon_2 \quad (2)$$

Where,  $C_0$ ,  $C_1$  and  $C_2$  are intercept terms; When the value of  $j$  is 0,  $\sigma_{110}$ ,  $\sigma_{120}$ ,  $\sigma_{130}$ ,  $\sigma_{140}$  are the linear influences of pleasant emotion, arousal emotion, admiration and emotional trust on the search of products by the audience watching cosmetics category livestream, respectively;  $\sigma_{210}$ ,  $\sigma_{220}$ ,  $\sigma_{230}$ ,  $\sigma_{240}$  are the linear influences of pleasant emotion, arousal emotion, admiration and emotional trust on the purchase of products by the audience watching cosmetics category livestream, respectively. When the value of  $j$  is 1,  $\sigma_{111}$ ,  $\sigma_{121}$ ,  $\sigma_{131}$ ,  $\sigma_{141}$  are the linear effects of pleasant emotion, arousal emotion, admiration and emotional trust on the search of products by the audience watching clothes category livestream, and  $\sigma_{211}$ ,  $\sigma_{221}$ ,  $\sigma_{231}$ ,  $\sigma_{241}$  are the linear effects of pleasant emotion, arousal emotion, admiration and emotional trust on the purchase of products by the audience watching clothes category livestream, respectively. When the value of  $j$  is 2,  $\sigma_{112}$ ,  $\sigma_{122}$ ,  $\sigma_{132}$ ,  $\sigma_{142}$  are the linear effects of pleasant emotion, arousal emotion, admiration and emotional trust on the search of products by the audience watching the food category livestream, respectively;  $\sigma_{212}$ ,  $\sigma_{222}$ ,  $\sigma_{232}$ ,  $\sigma_{242}$  are the linear effects of pleasant emotion, arousal emotion, admiration and emotional trust on the purchase of products by the audience watching the food category livestream, respectively.  $\lambda_{11}$  and  $\lambda_{21}$  are the regression coefficients of the control variables, respectively;  $\varepsilon_1$  and  $\varepsilon_2$  are the residual terms.

### (3) Empirical Results Analysis of Econometric Model

This study used Stata/MP 13.0 software to analyze the data. The descriptive statistics of the number of screen bullet word crawled by each Livestreamer livestream website are shown in Table 9.

**Table 9** Descriptive statistics of number of words for each dimension of information source characteristics for three product types (days)

Livestreamer Type	Emotional Characteristics	Number of words Mean	Median	SD	Min.	Max.
Cosmetics	JO	90.60	88.50	53.01	5	198
	AR	550.98	559.50	316.25	36	1133
	AD	489.40	491.00	280.922	32	1008
	TR	640.72	647.50	368.55	42	1311
Clothes	JO	253.50	260.50	132.923	18	494
	AR	349.43	359.50	184.44	24	676
	AD	305.82	313.50	162.14	23	600
	TR	412.51	427.00	218.10	29	811
Food	JO	385.49	386.50	201.79	43	786
	AR	252.52	249	132.90	30	498
	AD	293.20	295.50	128.22	76	497
	TR	220.83	217	116.36	25	451

Further descriptive statistics were performed for SN, PN and PP and the results are shown in Table 10.

**Table 10** Descriptive Statistics Results

Variables	No. of Days	Mean	Median	SD	Min.	Max.
SN (Cosmetics)	288	1983.57	2005.00	1138.10	133	3967
PN (Cosmetics)	288	247.57	250	113.50	63	446
PP (Cosmetics)	288	372.70	388	164.41	85	652
SN (Clothes)	288	1096.39	1163.50	575.74	82	2099
PN (Clothes)	288	229.20	236	57.58	128	329
PP (Clothes)	288	458.41	453	166.05	166	746
SN (Food)	288	771.08	765.50	403.06	91	1494
PN (Food)	288	96.32	95.50	40.13	29	169
PP (Food)	288	221.94	215.50	101.18	50	399

The standardized data were put into equations (1) and (2) for regression analysis, and the model regression results are shown in Table 11.

**Table 11** Regression Results

Variables	SN	PN
$I_0$	-1.397 (5.787)	48.469*** (1.274)
$I_1$	3.409 (4.431)	118.845*** (0.510)
$I_2$	-9.434 (5.096)	19.539*** (1.408)
$JO \cdot I_0$	0.879*** (0.078)	0.079*** (0.018)
$JO \cdot I_1$	1.352*** (0.126)	0.130*** (0.013)
$JO \cdot I_2$	0.525*** (0.059)	0.073** (0.027)
$AR \cdot I_0$	1.531*** (0.091)	0.149*** (0.020)
$AR \cdot I_1$	0.811*** (0.089)	0.083*** (0.009)
$AR \cdot I_2$	1.183*** (0.089)	0.086*** (0.018)
$AD \cdot I_0$	1.003*** (0.108)	0.107*** (0.024)
$AD \cdot I_1$	0.899*** (0.091)	0.093*** (0.009)
$AD \cdot I_2$	0.024** (0.010)	0.109*** (0.028)
$TRt \cdot I_0$	0.932*** (0.262)	0.136* (0.059)
$TRt \cdot I_1$	0.465*** (0.065)	0.046*** (0.006)
$TR \cdot I_2$	1.209*** (0.094)	0.004 (0.003)
$PP$	0.002* (0.001)	0.005 (0.003)
$R^2$	0.998	0.996

## 5. Results Discussion

The results of Study 2 show that the emotions of other audiences who watching the livestream can also influence consumers who watching the same show, which in turn enhances consumers' willingness to purchase products recommended by the livestream. Specifically, for the effect of watching the cosmetics category livestream on product search, the coefficients of pleasant emotion, arousal emotion, admiration and emotional trust were found to be 0.879, 1.352, 1.003 and 0.932

respectively and were statistically significant; meanwhile, for the effect of watching cosmetics category livestream on the product purchase, the coefficients of pleasant emotion, arousal emotion, admiration and emotional trust were 0.079, 0.149, 0.107, and 0.136, respectively, and were statistically significant. Therefore, H1b, H2b, H3b, and H4b were verified. For the effect of watching clothes livestream on product search, the coefficients of pleasant emotion, arousal emotion, admiration and emotional trust were found to be 1.352, 0.811, 0.899 and 0.465, respectively, and were statistically significant; meanwhile, for the effect of watching clothes livestream on product purchase, the coefficients of pleasant emotion, arousal emotion, admiration and emotional trust were found to be coefficients were 0.130, 0.083, 0.093, and 0.046, respectively, and were statistically significant. Hence, H1b, H2b, H3b, and H4b were verified. Therefore, we believe that for the other audiences watching the cosmetics and clothes categories of Livestreamer livestreaming, the pleasant emotion, arousal emotion, admiration and emotional trust they inspire can increase search and purchase behaviors. Among them, emotional trust and arousal emotion are the most significant, followed by admiration and pleasant emotion. The reason is that livestream Online celebrities use humorous language style, and a very charming image, through their own experience and professional analysis, to show the function of the products and explain the eye-catching points, which will greatly reduce the perceived risk of consumers for cosmetics and clothing products and set up activities such as limited time flash sale to interact with the audience. The emotional trust, arousal emotion, admiration and pleasant emotion aroused will be infected to the consumers, which in turn will enhance the purchasing behavior.

For the effect of watching food livestream on product search online, the coefficients of pleasant emotion, arousal emotion, and admiration were found to be 0.525, 1.183, and 1.209, respectively, and were statistically significant, while emotional trust was not significant; for the effect of watching food livestream on product purchase, the coefficients of pleasant emotion, arousal emotion, and admiration were found to be 0.086, 0.109, and 0.073, and were statistically significant, while emotional trust was not significant. Hence, H1b, H2b, and H3b were verified, while H4b was not. Therefore, we conclude that for other audiences who watch food Livestreamer livestream, the pleasant emotion, arousal emotion, and admiration they inspire can increase search and purchase behavior, while emotional trust has no effect on consumer search and purchase intentions. This contradicts the findings of previous studies on advertising virtual spokespersons, which have found that trustworthiness is a key factor influencing consumers' feelings and decisions (Keeling et al., 2010). In this study, we argue that consumers are more likely to rationalize when faced with food-related decisions (Moore and Konrath, 2015). There is a greater focus on the description and acquisition of objective information (Souiden and Diagne, 2009). Also, in psychological studies, it is shown that when performing food-related information processing, consumers enable the cognitive decision-making system for rational analysis (Moody et al., 2010). Therefore, for enhancing the willingness to purchase food products, consumers need deeper cognitive trust rather than the shallow emotional trust triggered by the Online celebrities' performances alone.

## **6. Research Conclusion and Discussion**

### *6.1. Research Conclusion*

This study investigated the influence of online celebrities in livestream on consumers' purchase intention and its underlying mechanism based on the theory of emotional contagion. We examined and verified that through a survey for obtaining data and applied structural equation modeling that

consumers are infected with pleasant emotion, admiration, arousal emotion, and emotional trust during watching livestream, which enhance their purchase intentions. We developed a PYTHON crawler for obtaining real data and applied an econometric model to analyses the data sets, the results demonstrated that audiences of online celebrities in livestream are indirectly emotionally infected by other audiences who are also watch livestreams with their real-time screen bullet interactions. In summary, this study finds that on the one hand, audiences are directly emotionally infected by online celebrities' performances in livestreams, and on the other hand, audiences are indirectly emotionally infected by screen bullet interactions from other audiences, which ultimately work together to temporarily put them into an impulsive state and increase their purchase intentions. //

#### (1) Theoretical Contributions

In terms of theoretical advancement, first, previous research on emotional contagion has mostly focused on social psychology (HKelly et al., 2001), and the only few applications in marketing have been on the influence of service personnel's emotional changes on customers' emotions and their purchase behavior in offline service contexts (Du et al., 2011). This study introduces the emotion contagion theory to the study of livestream, and finds that consumers are infected with pleasant emotion, admiration, arousal emotion and emotional trust during watching the livestream, thus enhancing their purchase intention. It has positive theoretical value for enriching the study of emotion contagion theory.

Second, existing studies on the influence of livestream on consumer purchasing behavior have focused on the characteristics of Livestreamer information sources (Park et al., 2020), the facial attractiveness of Online celebrities (Peng et al., 2020), social motivation (Hilvert-Bruce et al., 2018), proposed social interactions (Sun et al, 2019) and other perspectives (Kemp et al 2020)kemp

. In contrast, this study takes a different approach to explore the impact of Livestreamer livestream on consumer purchasing behavior from an emotional perspective, using emotional contagion as a theory, which provides a more unique perspective to further recognize and understand the impact of Livestreamer livestream on consumer behavior. In addition, a category of Livestreamer livestream of different product types was conducted. It was found that for cosmetics and clothing categories, pleasant emotion, arousal emotion, admiration and emotional trust can increase purchase behavior. For the food category, only pleasant emotion, arousal emotion and admiration can increase purchase behavior. For other audiences watching food livestream, the pleasant emotion, arousal emotion, and admiration can increase search and purchase behavior, but emotional trust cannot, because due to the special nature of food, consumers rely more on rational thinking to make decisions (Moody et al., 2010), thus requiring more cognitive trust than emotional trust. This is to some extent also a useful complement to the theory of Livestreamer livestream and its category.

Third, compared with traditional offline shopping (Till and Busler, 2000) and celebrity endorsement advertising (Friedman, 1979), the most disruptive feature of Livestreamer livestream is the real-time multi-directional interaction by virtue of the screen bullet medium, which directly connects audiences with Online celebrities, as well as connects audiences with each other, constituting the main content of the livestream. As a result, consumers are not only influenced by the Online celebrities in the process of watching livestream, but also by other audiences. However, existing studies on the influence of Livestreamer livestream on consumers' purchase intention have only explored the direct effect of the Online celebrities themselves (Park et al, 2020), ignoring the indirect effect from other audience screen bullet interactions. In contrast, this study, developed from the perspective of multiparty emotional contagion, can consider the Online celebrities themselves

and other audiences as a joint whole, arguing that the emotional performances of Online celebrities will infect consumers, and other audiences infected by Online celebrities will also indirectly infect consumers through screen bullet interactions, working together to enhance consumers' purchase intentions. It further complements the existing research background and research ideas of Livestreamer livestream.

In terms of research methodology, this study uses a combination of multiple quantitative methods, where the individual methods corroborate each other to expand the robustness of the research findings. First, by using a questionnaire survey, it was initially verified that the emotional labor of Online celebrities stimulates consumers' pleasant emotion, arousal emotion, emotional trust and admiration, which in turn enhance consumers' purchase intention of products recommended by them. Second, most previous studies on Online celebrities livestream use questionnaire research data, which can only measure consumers' purchase intention, which does not fully and truly characterize purchase behavior (Hilvert-Bruce et al., 2018; Park et al, 2020). This study, on the other hand, uses screen bullet crawlers, text analysis, live lexicon recruitment, and real secondary purchase behavior data to verify that there are significant differences in screen bullet interactions between Online celebrities and previous spokesperson advertisements, and offline shopping guides, i.e., the emotions of other audiences watching Livestreamer livestream can also infect consumers and thus influence purchase behavior. It has a certain reference value for the subsequent related research about Livestreamer livestream marketing.

## (2) Marketing Insights

First, for online celebrities, they should pay attention to their own emotional performances. In the Livestreamer 3.0 era, the new sales model of livestream marketing has overturned the original sales pattern and brought new ways of winning and cashing channels to online celebrities. However, under the low threshold and high return sales mode, some online celebrities have lost their way and lost their bottom line. Although livestream marketing is hot, it should not grow wildly. Livestream online celebrities should pay attention to their traffic advantages and great influence, play their roles well and achieve legal compliance. Specifically, according to the conclusion of this study, the motivation of consumers' emotional needs should be considered comprehensively and corresponding combination programs should be formulated. In terms of direct contagion effect, online celebrities should pay more attention to their own emotion management in their performances, and need to consider more about how to use their own resources to infect consumers and bring them high-quality content output as well as the ability to select products accurately; in terms of indirect contagion, online celebrities should increase their interaction with audiences and inspire more screen bullets to be generated. Specifically, this can be done through a more in-depth and down-to-earth way of marketing and event organization. To be specific, online celebrities can interact with the audience more frequently by reading audiences' screen bullet comments. They can also make category for the audience watching the livestream. Under the premise of professional explanation of product-related knowledge, for male audiences, more interactive lottery draw sessions can be set up, while for female audiences, more funny and pleasant atmosphere can be created, so that consumers in the virtual space can produce strong sensory impact and emotional experience.

Secondly, for consumers, on the one hand, in the process of online celebrities, it is necessary to keep a clear mind, fully consider their actual needs, improve the recognition of livestream online celebrities and their marketing, promote rational consumption rather than impulsive consumption, choose credibility and cost-effective products, in order to have a pleasant shopping experience. On the other hand, there is nothing wrong with consumers recommending online celebrities for others

to get recognition, but this expectation should not be overly magnified, not all livestream online celebrities and products are worth recommending, which should be subject to their characteristics and the quality of products.

Thirdly, for brands and platform companies, livestream online celebrities can indeed bring high traffic and high turnover rate. However, it should be made clear that livestream Livestreamer marketing is not equal to brand value, let alone sustainable branding. The enhancement of brand value lies in its own brand construction, such as assets, information technology, channel construction and word-of-mouth management, as well as experiential marketing, etc. livestream Livestreamer marketing is only a promotional tool to arouse consumers' emotional impulses. Only on the basis of good brand building can this approach of promotion be meaningful for brands. Therefore, the role of livestream Livestreamer marketing should be taken seriously, and the promotion should not ignore the improvement of product quality at the same time. If the company is in need of livestream Livestreamer marketing, it should also carefully identify the style persona of the livestream Livestreamer and the degree of professionalism. Do not just focus on traffic and income, otherwise it will limit the long-term development of the brand itself. In addition, the false endorsement of livestream Livestreamer and other chaos should be regulated and the punishment should be intensified to maintain market order.

### (3) Research Limitations and Future Directions

This paper also has certain research limitations. First, this study only explores the influence of positive emotions on consumers' purchase behavior during the Livestreamer livestream, and does not explore negative emotions such as fear, fright, sadness, etc. Previous studies on emotions found that negative emotions may influence consumers to make compensatory consumption, and subsequent studies can further explore the influence of negative emotions during the livestream. Secondly, this study only focuses on the emotional perspective in the process of livestream, and does not consider the influence of cognitive perspective on consumer behavior, which can be further explored by organically integrating the two in the future. Moreover, the contextual questionnaire was used in Study 1, and the subjects' purchase intention may not be actually put into purchase behavior in reality. Future research can try to use consumer laboratory experiments and field experiments to further verify the intrinsic mechanism of Livestreamer livestreaming and better predict consumers' purchasing behavior. Finally, in Study 2, we selected only the top three product types in the cosmetics, clothing, and food categories based on the official Taobao rankings released, and future research could further refine the different product types and may yield other more interesting conclusions.

## Reference

- Aaker, J. L., Garbinsky, E. N., Vohs, K. D., 2012. Cultivating admiration in brands: Warmth, competence, and landing in the “golden quadrant”. *J. Consum. Psychol.* 22(2), 191-194.
- Baker, J., Levy, M., Grewal, D., 1992. An experimental approach to making retail store environmental decisions. *J. Retail.* 68(4), 445-460.
- Barsade, S. G., Coutifaris, C. G., Pillemer, J., 2018. Emotional contagion in organizational life. *Res. Organ. Behav.* 38, 137-151.
- Becker, B. E., Luthar, S. S., 2007. Peer-perceived admiration and social preference: Contextual correlates of positive peer regard among suburban and urban adolescents. *J. Res. Adolesc.* 17(1), 117-144.
- Bloomberg, 2020. The World’s Livestream Queen Can Sell Anything, available at <https://www.bloomberg.com/features/2020-viya-china-livestream-shopping>, (accessed at 16<sup>th</sup> April, 2020)
- Chen, Y. H., Chen, M. C., Keng, C. J., 2020. Measuring online live streaming of perceived servicescape: Scale development and validation on behavior outcome. *Internet Res.* 30 (3), 737-762.
- Cheng, F. F., Wu, C. S., Yen, D. C., 2009. The effect of online store atmosphere on consumer's emotional responses - an study of music and colour. *Behav. Inform. Technol.* 28(4): 323-334.
- Cheshin, A., Rafaeli, A., Bos, N., 2011. Anger and happiness in virtual teams: Emotional influences of text and behavior on others’ affect in the absence of non-verbal cues. *Organ. Behav. Hum. Dec.* 116(1), 2-16.
- Chua, R. Y. J., Ingram, P., Morris, M. W. 2008. From the head and the heart: Locating cognition- and affect-based trust in managers' professional networks. *Acad. Manage. J.* 51(3), 436-452.
- CNKI, 2020. Available at <https://www.cnki.net/> (accessed 16<sup>th</sup> April, 2020)
- Coviello, L. Sohn, Y., Kramer, A. D., 2014. Detecting emotional contagion in massive social networks, *PloS One* 9 (3), 309-315.
- Dalian University of Technology Emotional Vocabulary Ontology Database, 2020. Available at <https://www.programmingsought.com/article/74565896488/> (accessed at 16<sup>th</sup> April, 2020)
- DelVicario, M., Bessi, A., Zollo, F., Petroni, F., Scala, A., Caldarelli, G., Stanley, E., Quattrociochi, W. 2016. The spreading of misinformation online. *P. Natl. Acad. Sci. USA* 113(3), 554–559.
- Dodds, W. B., Monroe, K. B., Grewal, D., 1991. Effect of price, brand and store information on buyers’ products evaluations. *J. Mark. Res.* 28(03), 307-319.
- Donovan, R. J., Rossiter, J. R., Marcoolyn, G., 1994. Store atmosphere and purchasing behavior. *J. Retail.* 70(3): 283-294.
- Du, J., Fan, X., Feng, T., 2011. Multiple emotional contagions in service encounters. *J. Acad. Market Sci.* 39(3), 449-466.
- Fan, R., Xu, K., Zhao, J. 2017. An agent-based model for emotion contagion and competition in online social media. *Physica A.* 495, 245-259.
- Ferrara, E., Yang, Z., 2015. Measuring emotional contagion in social media. *PLoS One*, 10(11), 1–14.
- Friedman, H., Friedman, L., 1979. Endorser effectiveness by product type. *J. Advertising* 19(07), 63-69.



- Greenwald Michelle, 2020. Live Streaming E-Commerce Is The Rage In China. Is The U.S. Next? Forbe. Available at <https://www.forbes.com/sites/michellegreenwald/2020/12/10/live-streaming-e-commerce-is-the-rage-in-china-is-the-us-next> (accessed 16<sup>th</sup> April, 2020).
- Habibi, M.R., Laroche, M., Richard, M.O., 2014. The roles of brand community and community engagement in building brand trust on social media. *Comput. Hum. Behav.* 37(37), 152–161.
- Hatfield, E., Cacioppo, J., Rapson, R. L., 1994. *Emotional contagion*. New York: Cambridge University Press.
- Hilvert-Bruce, Z., Neill, J. T., Sjöblom, M., Hamari, J., 2018. Social motivations of live-streaming viewer engagement on Twitch. *Comput. Hum. Behav.* 84, 58-67.
- HKelly, J. R., Barsade, S. G., 2001. Mood and emotions in small groups and work teams. *Organ. Behav. Hum. Dec.* 86 (1), 99-130.
- Hou, F., Guan, Z., Li, B., Chong, A. Y. L., 2019. Factors influencing people's continuous watching intention and consumption intention in live streaming: evidence from china. *Internet Res.* 30(1), 141-163.
- Immordino-Yang, M. H., McColl, A., Damasio, H., Damasio, A. 2009. Neural correlates of admiration and compassion. *Neuroscience* 106(19), 8021–8026.
- Emotional characteristics and time series analysis of Internet public opinion participants based on emotional feature words
- Keeling, K., McGoldrick, P., Beatty, S., 2010. Avatars as salespeople: communication Style, Trust and Intentions. *J. Bus. Res.* 63(8), 793-800.
- Kemp, E., Briggs, E. and Anaza, N.A. (2020), "The emotional side of organizational decision-making: examining the influence of messaging in fostering positive outcomes for the brand", *European Journal of Marketing*, Vol. 54 No. 7, pp. 1609-1640.
- Kim, H. S., Kim, M., 2020. Viewing sports online together? psychological consequences on social live streaming service usage. *Sport Manage. Rev.* 6(2), 1-12.
- Kramer, A. D., Guillory, J. E., Hancock, J. T., 2014. Experimental evidence of massive – scale emotional contagion through social networks , *Proc. Natl. Acad. Sci.* 111 (24), 8788-8790 .
- Ladhari, R., 2007. The effects of consumption emotions on satisfaction and word-of-mouth communications. *Psychol. Market.* 24(12), 1085-1108.
- Lu, A. S. , Li, Z. H. , Jin, H. X. , Zhang, J. Y. , & Wei, H. . (2013). Research of distributed search engine based on hadoop (dseh). *Applied Mechanics & Materials*, 427-429, 2126-2129.
- Mian, S. A., Hattab, H. W., 2013. How individual competencies shape the entrepreneur’s social network structure: evidence from the MENA region. *Int. J. Bus. Globalization* 11(4), 399-412.
- Monsuwé, T. P., Gellaert, B. G. C., Ruyter, K., 2004. What drives consumers to shop online? A literature review. *Int. J. Serv. Ind. Manag.* 15(1), 102-121.
- Moody, W, Kinderman, P., Sinha, P., 2010. An exploratory study: relationships between trying on clothing, mood, emotion, personality and clothing preference. *J. Fash. Mark. Manag.* 14(1), 161-179.
- Moore, D. J., Konrath, S., 2015. "I can almost taste it:" why people with strong positive emotions experience higher levels of food craving, salivation and eating intentions. *J. Consum. Psychol.* 25(1), 42-59.
- NTUSD, 2020. Available at <https://rdrr.io/rforge/tmcn/man/NTUSD.html>, (accessed at 16<sup>th</sup> April 2020).
- Oliver, R. L., Rust, R. T., Varki, S., 1997. *Customer delight: foundations, findings, and managerial*

- insight. *J. Retail.* 73(3), 311-336.
- Park, H. J., Lin, L. M., 2020. The effects of match-ups on the consumer attitudes toward online celebrities and their live streaming contents in the context of product endorsement. *J. Retail. Consum. Serv.* 52, 1-6.
- Peng, L., Cui, G., Chung, Y., Zheng, W., 2020. The Faces of Success: Beauty and Ugliness Premiums in e-Commerce Platforms. *J. Mark.* 84(4), 67-85.
- Pihlström, M., Brush, G. J., 2008. Comparing the perceived value of information and entertainment mobile services. *Psychol. Mark.* 25(8), 732-755.
- Pimentel, R. W., Reynolds, K. E., 2004. A model for consumer devotion: Affective commitment with proactive sustaining behaviors. *J. Acad. Mark. Sci. Rev.* (5), 1-45.
- Pugh, S. D., 2001. Service with a smile: emotional contagion in the service encounter. *Acad. Manag. J.* 44(5), 1018-1027.
- Russell, J. A., 1980. A circumplex model of affect. *J. Pers. Soc. Psychol.* 39(6), 1161-1178.
- Russell, J. A., Anna, W. A., Mendelsohn, G. A., 1989. Affect grid: A single-item scale of pleasure and arousal. *J. Pers. Soc. Psychol.* 57(3), 493-502.
- SEO China Agency 2020. Wei Ya and Li Jiaqi: Most Famous KOLs Driving Chinese Live E-commerce Viral (<https://seoagencychina.com/wei-ya-and-li-jiaqi-most-famous-kols-driving-chinese-live-e-commerce-viral/> accessed 2<sup>nd</sup> July 2020)
- Souiden, N., Diagne, M., 2009. Canadian and french men's consumption of cosmetics: a comparison of their attitudes and motivations. *J. Consum. Mark.* 26(2), 97-109.
- Sun, Y., Shao, X., Li, X., Guo, Y., Nie, K., 2019. How live streaming influences purchase intentions in social commerce: an it affordance perspective. *Electron. Commer. Res. Appl.* 37, 1-12.
- National Taiwan University Sentiment Dictionary (NTUSD), 2020, available at: [https://www.haolizi.net/example/view\\_52594.html](https://www.haolizi.net/example/view_52594.html), (accessed 15th April 2020)
- Teh Cheryl, 2020. "Meet China's 'Lipstick King,' an outspoken 28-year-old e-commerce streamer who fans adore and brands fear". Available at <https://www.businessinsider.com/austin-li-jiaqi-chinas-lipstick-king-online-shopping-taobao-2021>, (accessed at 16<sup>th</sup> April 2020).
- Till, B.D., Busler, M., 2000. The match-up hypothesis: physical attractiveness expertise and the role of fit on brand attitude purchase intentions and brand beliefs. *J. Adv.* 29(3), 1-13.
- Taobao, 2020, available at <https://www.taobao.com> (accessed 1st April 2019 – 1<sup>st</sup> April 2020)
- Taobao Live Data Rankings 2020. Available at <https://www.similarweb.com/website/taobao.com/#overview>, (accessed 1st April 2019 – 1st April 2020)
- Trivedi J P, Sama R., 2020. The Effect of Influencer Marketing on Consumers' Brand Admiration and Online Purchase Intentions: An Emerging Market Perspective. *J. Int. Commer.* 19(1):103-124.
- Wang, Y. S., 2019. User experiences in live video streaming: a netnography analysis. *Internet Res.* 2, 1066-2243.
- Willems, K., Brengman, M. and Van Kerrebroeck, H. (2019), "The impact of representation media on customer engagement in tourism marketing among millennials", *European Journal of Marketing*, Vol. 53 No. 9, pp. 1988-2017.
- Wohlfeil, M., Whelan, S., 2012. "Saved!" by Jena Malone: An introspective study of a consumer's fan relationship with a film actress. *J. Bus. Res.* 65(4), 511-519.
- Zhang, K. Z., Cheung, C. M., Lee, M. K., 2014. Examining the moderating effect of inconsistent

reviews and its gender differences on consumers' online shopping decision. *International J. Inf. Manag.* 34(2), 89-98.

Zhi Gua Data, 2020, available at: [https://www.zhigua.cn/?chl=baidu-zhiguaci-pinpaici&renqun\\_youhua=1918883](https://www.zhigua.cn/?chl=baidu-zhiguaci-pinpaici&renqun_youhua=1918883) (accessed 1st April 2019 – 1st April 2020)

Zhou J., Zhou J., Ding Y., Wang, H., 2019. The magic of danmaku: a social interaction perspective of gift sending on live streaming platforms, *Journal of Electronic Commerce Research and Applications.* 34 1–9.

## **Appendix A.**

The concept of "We Media" comes from Dan Gillmor, the most famous IT columnist in Silicon Valley. Gillmor put forward the idea of "Journal 3.0" on his blog on September 28, 2001. In this idea, news media 1.0 is traditional media or old media, news media 2.0 is new media or new media, and news media 3.0 is "We Media" with blog as the trend. In March 2002, Gillmor further called his "news media 3.0" as "journalism's next wave". At the end of 2002, Gillmor formally put forward the concept of "We Media". He wrote an article entitled news for the next generation: here comes "we" in Columbia news review, a famous journal of journalism published in January 2003. "We Media" will be the mainstream media in the future because of the surge of new things on the Internet, such as online discussion areas, blogs and so forth. In July 2003, the media center of the American Journalism Association published a more than 60 page "We Media" Research Report, which was jointly written by Schein Bowman and Chris Willis. Media (we media) is a way for the general public to understand how to provide and share their own facts and news after they are strengthened by digital technology and connected with the global knowledge system. " In this definition, it is emphasized that the communication theme of we media is "the general public", the communication content of we media is "their own facts and their own news", and the communication means or technical conditions of we media are "digital technology strengthening and connecting with global knowledge".

## **Appendix B.**

"Screen bullet", is an emerging new feature on online video sites, which allows real-time comments from viewers to fly across the screen like bullets. Bilibili, a leading video live streaming website with feature of "screen bullets" as well as allowing viewers post or send each other text messages while watching livestreams became one of the most popular platforms with Average daily active users (DAUs) reached 53.3 million in 2020, a 42% increase from the same period in 2019.