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Explore the Feeling of Presence and Purchase Intention in Livestream Shopping: A Flow-Based Model

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Abstract: Livestream shopping has attracted great attention in an increasingly digitalized society. This study is to explore the mechanism through which social presence and physical presence affect consumer purchase intentions in livestream shopping as an emerging e-commerce model. Based on the flow theory, this study proposes an integrated model to explain the mechanism through which the feeling of presence affects consumers' purchase intentions in livestream shopping. Empirical data on livestream shopping were collected in China to test the proposed model for an exploratory study. The results show that the feeling of physical presence influences consumers' purchase intentions through concentration and perceived control, and the feeling of social presence influences consumers' purchase intentions through concentration and enjoyment, and, thus, both social presence and physical presence are important elements in livestream shopping. This study provides a better understanding on the mechanism of how the feeling of presence helps improve purchase intentions in livestream shopping. This study shows both physical presence and social presence are positively related to consumers' purchase intention, but with different paths, and, thus, sheds new lights on the feeling of presence and its impact on consumer behaviors in e-commerce.

Keywords: interactive marketing; flow theory; livestream shopping; presence; purchase intention; e-commerce

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1. Introduction

Livestream shopping is a new way to buy and sell products in an increasingly digitalized society. Unlike traditional marketing approaches that often rely on pictures and text descriptions to attract consumers, livestream brings a new type of interactive social space to change the way brands interact with their audiences in e-commerce businesses [1,2]. Using a live video strategy, livestream can engage viewers in immediate and authentic ways that other social media formats cannot [3]. During the livestream, consumers can communicate with the livestream anchors and other consumers and sometimes watch product usage in real time. This new shopping approach is enjoying increasing popularity among consumers because consumers can learn about products and services from the anchors and from each other, rather than only through product description, pictures, or consumer reviews such as likes, ratings and comments [4–6] and, thus, can greatly improve consumers' purchase intentions [7–9].

Along with the fast development of social media and e-commerce, booming livestream shopping has attracted scholars' attentions and existing research has focused on how livestreaming affects consumers' experiences and purchase intentions [1,10–13]. For instance, studies have employed a consumer engagement perspective to explore consumers' purchase intentions in livestream shopping [14,15], and others have examined the mediating effect of consumers' trust in livestreaming and consumers' purchase intentions [9,16]. While the existing studies have generated important insights on livestream shopping, an

emerging stream of research has called on researchers to adopt the concept of presence to investigate the impact of the feeling of presence on consumers' purchase intentions [7,17,18], which has a great potential to help better understand the dynamics of livestream shopping and the value livestreaming can bring to contemporary marketing research and practice [8]. The feeling of presence is a "perceptual illusion of non-mediation", which occurs when people fail to perceive or realize the existence of a medium in their interactions with others and thus respond as if the medium were not there [7,19,20]. Presence in a mediated environment such as livestream shopping consists of physical presence and social presence [19]. In the dynamic process of livestream shopping, consumers not only experience the social presence of socially being together with others through interacting with livestream anchors and other consumers, but also virtually experience the physical presence of being located somewhere, generated through the interface [7,13]. While social presence has been examined in many mediated environments such as online gaming or behaviors in virtual communities, few studies have explored the roles of physical presence and social presence at the same time or their joint effects in online shopping activities [7,15,17,18]. It is worthwhile to explore whether both physical presence and social presence facilitate the formation of purchase intention in livestream shopping [7,17]. This is critical in understanding the mechanism through which livestreaming attracts customers to make purchase decisions. In addition, although both physical presence and social presence are important types of presence, it is not clear what the differentiated effects are of these two types of presence affecting consumers' purchase intentions in livestream shopping [7,18]. While many studies have explored livestream shopping, there is a paucity in integrating the whole process [7]. This study attempts to provide such an integrated model

This study is intended to employ the flow theory to explore the impact of the feeling of presence on purchase intentions in livestream shopping—a flow-based interactive e-commerce business model. More specifically, this study will explore how the two dimensions of presence—both social presence and physical presence help form the flow so as to motivate consumers to make a purchase decision in the newly emerged livestream shopping. The flow theory is about the mental state of people who conduct their activities for pleasure, not for rewards of money or fame. and people experience a holistic sensation when they act with total involvement. The data were collected in China, one of the most important emerging markets, that has received increasing attention in management research due to its important role in the world market [21–25] and also has a flourishing livestream sector [7,9,13,16,25,26]. China is one of the first few markets to endorse and widely promote livestream shopping and has also achieved great success since Taobao launched the livestream function in 2016, known as the first year of livestream shopping in China [10]. According to the data from CNNIC (China Internet Network Information Center), the number of consumers participating in livestream shopping reached 390 million in December 2020, about 39.2 percent of the total number of internet users in China, and livestream shopping has become a very popular shopping approach among Chinese consumers.

The findings of this study will be able to shed light on livestream shopping, the fast-emerging shopping approach, for a better understanding on how to engage consumers and to increase their purchase intention in the increasingly digitalized consumer market, in particular, considering that the COVID-19 pandemic has forced consumers to rely more on enriched online experiences to make shopping decisions. In this study, a research model will be developed based on the flow theory and then empirically tested with the two dimensions of presence as antecedents, three dimensions of the flow including concentration, perceived control, and enjoyment as mediators, and consumers' purchase intention as the criterion. The remainder of the paper is organized as follows. We first present the theoretical framework based on the flow theory and related literature on presence, and then develop a research model on the proposed relationships, followed by data collection, analyses, results, and findings. The final section discusses theoretical and managerial implications of this study and further future research directions.

2. Theoretical Framework

2.1. Livestream Shopping

As a newly emerged e-commerce format, livestreaming provides real-time audio and video transmission of an event over the internet [27]. Livestream shopping is a new e-commerce format with high HCI (human–computer interaction) which can create the feeling of presence [7,26]: while consumers are not there physically, they can experience being there when interacting with the anchors and other consumers through HCI. As a rapidly emerging shopping approach, livestreaming has the power to expand the viewership into millions and reach audiences of an unprecedented scale for product marketing and sales [2,4].

Livestreaming is a unique method of online shopping, and it provides a highly interactive medium to introduce and demonstrate how to use the products to the consumers. Livestreaming has a public scrolling text screen at the livestream interface where customers can ask questions or requests through the text box to the screen, and livestream anchors can answer these questions immediately to achieve real-time communication [10]. Compared with traditional online shopping or television shopping channels, livestream shopping has three unique characteristics that can attract consumers to stay focused on shopping activities. First, consumers can learn about targeted products through real-time video display instead of only depending on pictures or text descriptions, such as in traditional online shopping [9]. Second, in livestream shopping, anchors can reply immediately whenever consumers ask questions on the targeted products, and consumers can also interact with other consumers, which leads to a better social experience for consumers than that in traditional television shopping channels [26] or traditional online shopping. Third, the lack of face-to-face interactions in traditional online shopping often leads to questions about the authenticities of marketers and their products while livestream shopping can solve this problem [12]. Therefore, livestreaming as a real-time, interactive, and authentic social shopping approach [2,9] can motivate consumers to be better involved in shopping activities and, thus, enhance their sense of presence and involvement, and ultimately increase their purchase intentions [3,9].

The increasing popularity of livestream shopping in e-commerce has attracted great research interest. Research has explored the impact of interface features (e.g., the website) on consumers' behaviors [27], consumer engagement in livestream shopping [1,8,14], the impact of comments made in livestream shopping on consumers' purchase intentions [28], as well as the mechanism through which livestreaming affects purchase intention [7,13], with important insights generated on livestreaming and consumer behaviors [11,18]. Table 1 summarizes the key antecedents of purchase intentions in livestream shopping examined in previous research.

Table 1. A summary of antecedents of purchase intentions in livestream shopping.

Antecedents of Purchase Intentions in Livestreaming	Studies
Interface features	[27]
Comments made in livestreaming	[28,29]
Psychological distance	[11]
Para-social interaction	[10]
Live content—product fit	[30]
Consumer trust	[9,11,12,16]
Consumer engagement	[1,8,14]
Social presence	[7,13,17,18,26]

2.2. Presence

With the fast development of virtual reality technology, the sense of 'being there', or presence, in a mediated environment has received substantial attention [2,19]. Presence is a sense of being present at a remote location through human–computer interaction [31], a virtual presence generated in the virtual environment [32]. Presence as the "perceptual illusion of non-mediation" happens when a person fails to perceive or recognize the existence of a medium in the experience of a technology intermediary [20].

Scientific research on presence shows that, from a psychological perspective, presence consists of physical presence and social presence [20]. Physical presence refers to the feeling of being somewhere, while social presence refers to the feeling of being (and communicating) with others [19]. While physical presence and social presence do not always occur at the same time, consumers in livestream are able to feel physical presence and social presence at the same time, thanks to the development of human–computer interaction technology often used in the livestream virtual environment.

Research shows that four main factors can affect the feeling of presence [19,32–34], including the ability to create an intermediary environment that conveys enough information, real-time updates, social elements in the interactions, and users' characteristics. Livestreaming incorporates the first three in its interactions with consumers and thus can effectively stimulate the generation of the feeling of presence. Research literature has shown that social presence can impact consumers' purchase intention in livestreaming. Zhu et al. [35] used the stimulus–organism–response (SOR) theory to show that social presence had a positive effect on consumers' purchase intentions. However, few studies have investigated the impact of physical presence on consumers' purchase intentions in a mediated environment [7]. Therefore, more studies are still needed to better understand how the feeling of presence, both physical presence and social presence, can enhance purchase intentions in livestream shopping.

2.3. The Flow Theory

The flow theory was proposed in the 1970s based on research examining the mental state of people who carry out activities for pleasure, not for rewards of money or fame [36]. According to the flow theory, flow is the "holistic sensation that people feel when they act with total involvement", and a flow state is the state in which "people are so involved in an activity that nothing else seems to matter; the experience is so enjoyable that people will continue to do it even at great cost, for the sheer sake of doing it" [36]. The flow theory has been used for research in various fields including psychology, management, arts, human–computer interactions, and marketing to explore how individuals are motivated by and absorbed in what they are doing [36–41]. A great amount of research on flow has focused on a computer-mediated environment to investigate user experience in using the internet, with the antecedents of flow, including consistency of perceived skills and challenges, concentration, and interactions [42] and the consequences of flow, including increased learning, perceived behavior control, repeat visits, and positive subjective experiences [43]. These consequences are often experienced in livestream shopping activities. Therefore, the flow theory provides a good conceptual framework to explore how consumers are absorbed in the computer-mediated activities—livestream shopping and further make purchase decisions [7].

2.4. A Flow-Based Research Model on Livestream Shopping

Livestream shopping is a unique shopping approach occurring in a computer mediated environment. Studies have shown that livestream shopping is interactive, real-time, and often associated with the feeling of presence: feeling of being in a remote location—physical presence and feeling of being together with others—social presence [7,9,27,35]. Flow refers to the feeling of a person when fully engaged in an activity [36], such as livestream shopping, which makes people feel happy and have a sense of control [41]. Koufaris [39] classified flow into three dimensions: concentration, perceived control, and enjoyment. Based on

the flow theory and the concept of presence, it is proposed in this study that consumers experience a flow state during livestream shopping and the feeling of presence generated in livestream shopping leads to the sensation of acting with total involvement in this computer-mediated environment, which further leads to their purchase intentions. More specifically, this flow-based research model proposes that the feelings of presence (both physical presence and social presence) affect consumers' flow state in the interactive process of livestream shopping but in different ways: the feeling of physical presence facilitates consumers' concentration and perceived control which leads to a purchase decision, while the feeling of social presence enhances consumers' concentration and enjoyment which also leads to a purchase decision (please refer to Figure 1)

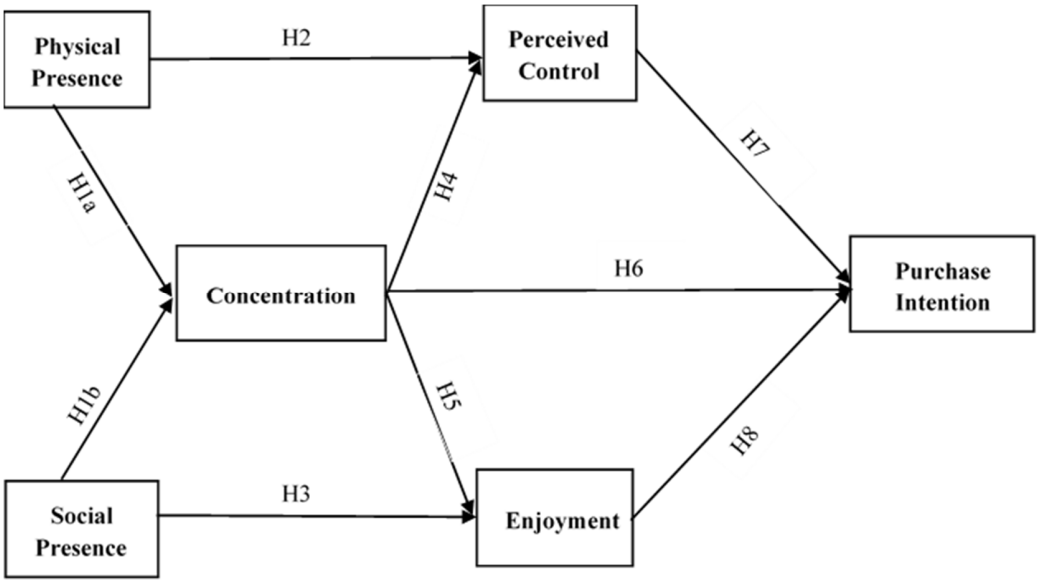

Figure 1. A research model on presence and purchase intention.

This research model employs the flow theory to examine the process of livestream shopping, and it incorporates the feeling of presence often generated in the virtual world into the consumer's flow state, to explore the dynamics of livestream shopping. This model is able to explain how the feelings of physical presence and social presence facilitate consumers' flow stage in livestream shopping—the sensation of total involvement in the computer-mediated shopping activities. Consumers' flow state in livestream shopping further motivates them to make purchase decisions because "the experience is so enjoyable that people will continue to do it even at great cost" [44]. Research hypotheses are developed in the following sections to elaborate on the proposed relationships.

3. Hypotheses

Presence, concentration, perceived control, and enjoyment. Past research has shown that presence as a psychological state can lead people to concentrate on focal activities in a computer-mediated environment [45,46]. A feeling of presence occurs when people consider objects in mediated environments as physically present ones, a perceptual illusion [47], and this perceptual illusion created in mediated environments can produce a feeling of immersion whereby people concentrate on the focal activities [46]. Biocca [48] has discovered that presence has the ability to shift users' concentration from the real world to the virtual environment. Agarwal and Karahanna [49] further revealed that people who were immersed in presence demonstrated more cognitive absorption and concentration. Finneran and Zhang [50] also suggested that presence was an important factor that enabled users to focus on computer-based tasks. More recently, Sajjadi et al. [51] pointed out that both physical presence and social presence could influence concentration in entertaining activities, which leads to people's flow experience. Wang and Lee [18] have also shown

that high human–computer interaction can generate users' presence and strengthen users' concentration. Therefore, it is hypothesized that:

H1a. *Physical presence is positively related to concentration in livestream shopping.*

H1b. *Social presence is positively related to concentration in livestream shopping.*

Physical presence refers to the feeling of being located in a remote place when immersed in a mediated environment [20]. In livestream shopping, the feeling of physical presence depends on the degree of interaction between consumers and the virtual world [9]. Consumers can obtain a high sense of physical presence from those websites with high information interaction and authenticity. With physical presence, consumers tend to forget that they are using a medium and thus consider the virtual environment as a real one in which they can control the focal activities, thanks to the quick and timely responses in the mediated environment [52], and this physical presence can lead to a high level of perceived control [53]. In addition, physical presence is able to motivate consumers to participate and further engage more in the mediated environment [52], which also produces more perceived control [54]. Pelet et al. [46] demonstrated that physical presence positively affected perceived control. Wang and Yao [55] also found that there was a positive relationship between physical presence and perceived control in the context of VR games. Hence, the following hypothesis is proposed:

H2. *Physical presence is positively related to perceived control in livestream shopping.*

Social presence is the feeling of being together with others when people are interacting with other people through a medium [56]. Social presence describes the situation when you are communicating with others in the mediated environment, you can feel that the person is at your side even though he or she may actually be far away [57]. Social presence gives people a sense of psychological intimacy and warmth in the mediated environment [58], which leads to enjoyment, similar to the experiences of being together with others in the real world [59], and the stronger the sense of social presence in the virtual world, the more enjoyment consumers can obtain [60]. Lombard and Ditton [20] pointed out that the most significant psychological impact of social presence was enjoyment. Fortin and Dholakia [60] also suggested that social presence can generate positive emotions and cognitions, such as enjoyment. Cyr et al. [61] found that social presence positively affected people's enjoyment in the context of online shopping. Shen's empirical study [62] on online commerce also showed that social presence could stimulate consumers' sense of enjoyment. Hence, it is hypothesized that:

H3. *Social presence is positively related to enjoyment in livestream shopping.*

Concentration is defined as focusing on a limited stimulus field and it is one of the most recognized dimensions in flow research [63]. Novak and his colleagues [64] showed that concentration, as a critical part of flow, would have impact on other elements of flow. Quinn [65] also demonstrated that some elements of flow may lead to other elements in the flow experience. When consumers are concentrating on shopping activities in livestream shopping, they tend to have high perceptions of their abilities to successfully navigate through the virtual environment and of how the web responds to their inputs [66,67], i.e., a high level of perceived control. Therefore, we expect that high concentration leads to high perceived control in livestream shopping. In addition, concentration also reflects the degree of efforts devoted to the focal events such as livestream shopping activities [68]. When consumers devote themselves to livestream shopping, they constantly search for new information on products or services to satisfy their needs, which often leads to happiness and excitement [69]. For instance, Liu et al. [68] showed that people experienced the highest level of enjoyment when they were intensely indulged in doing something. Liu et al. [68] also found that consumers' concentration significantly affected their enjoyment in mobile commerce. Hence, it is proposed in this study:

H4. *Concentration is positively related to perceived control in livestream shopping.*

H5. *Concentration is positively related to enjoyment in livestream shopping.*

Concentration, perceived control, enjoyment, and purchase intention. Research has shown that concentration as a key element of flow can positively affect an individual's intention to engage in certain activities by improving his or her overall experiences [69–71]. When individuals concentrate on an activity, their attention will be focused on a narrow stimulus field, which filters out other irrelevant thoughts and perceptions [72]. The consumers will then become more intensely absorbed in their activities and further generate a stronger desire to accomplish their current tasks [69], a behavioral intention. Empirical studies have demonstrated that concentration can affect consumers' purchase intentions. For instance, Xia and Sudharshan [73] discovered that interruptions in concentration could reduce consumers' satisfaction with online shopping which in turn reduced their purchase intentions. Koufaris [39] has shown that concentration had a positive effect on online consumers' purchase intentions. Wang and Hsiao [74] confirmed that concentration was positively related to consumers' intentions for future shopping in retail store shopping activities. Hence, it is hypothesized in this study:

H6. *Concentration is positively related to consumers' purchase intentions in livestream shopping.*

Perceived control is another important element in consumers' purchase intentions. When consumers are involved in a mediated environment, they often attempt to obtain more control, less effort, and higher efficiency in the process of interactions [75–77]. Moreover, with better perceived control, consumers will be able to obtain higher quality information [78], which is closely related to consumers' purchase intentions. It is argued that information quality can improve consumers' purchase intentions [79]. Dedeke [80] confirmed that there was a positive relationship between information quality and consumers' purchase intentions. Chen and Chang [29] also showed that information quality was an important antecedent of consumers' purchase intentions. Based on these analyses, it is hypothesized that:

H7. *Perceived control is positively related to consumers' purchase intentions in livestream shopping.*

Enjoyment is the intrinsic pleasure of being involved in an activity [39]. It is a positive emotion that can trigger consumers' purchase intentions. If consumers feel the enjoyment, they are very likely to make purchase decisions [81]. Jarvenpaa and Todd [75] suggested that enjoyment had a significant impact not only on offline shopping but also on online shopping. Eighmey and McCord [82] further proved that the enjoyment of shopping had a significant positive impact on consumers' purchase intentions in online shopping. Enjoyment in livestream shopping comes from the entertainment and excitement embedded in interactive shopping activities [83]. The higher level of enjoyment can motivate consumers to spend more time livestreaming which leads to increased purchase intentions [84]. Dholakia [85] also contended that consumers' purchase intentions are affected by emotional factors, such as enjoyment generated in livestreaming. It is expected in this study that consumers in livestream shopping are also more willing to make purchase decisions prompted by intrinsic interests and enjoyment generated in livestream shopping [86,87]. Therefore, it is hypothesized in this study:

H8. *Enjoyment is positively related to consumers' purchase intentions in livestream shopping.*

4. Methods

4.1. Sample and Data Collection

To explore the impact of the feeling of presence on purchase intentions in livestream shopping, data were collected with an online questionnaire in this exploratory study through recruiting consumers who have the experience of livestream shopping. The data were collected in China where livestream shopping is booming at an unprecedented scale. An online questionnaire was made available in China's main virtual communities including Weibo, WeChat groups, and Baidu Tieba. Respondents were recruited from these virtual

communities with a monetary reward of 10 RMB for anyone who completed the survey to participate in this project.

The questionnaire was available online for about a month in the summer of 2021, during which a total of 500 responses were received. To ensure that all our participants had the experiences of livestream shopping, we used a screening question in the survey. Based on the screening question and after checking the completeness and accuracy, we obtained 384 useable responses for analysis. Among the respondents included in the analysis, 62% were female and 32% were male. Respondents between the ages of 18 and 45 accounted for 92.5% of the total sample. In terms of education background, about 77.6% of the respondents had a bachelor's degree and 13% of the respondents had a master's degree or above. The relatively younger respondents and the higher education distribution are consistent with those in previous studies [7.10]. A detailed sample profile is reported in Table 2.

Table 2. Descriptive Statistics.

Variables	Category	Number	Percentage (%)
Gender	Male	146	38
	Female	238	62
Age	Under 18	12	3.1
	18–30	226	58.9
	30–45	129	33.6
	Above 45	17	4.4
Education	High school or below	36	9.4
	College or university	298	77.6
	Postgraduate or above	50	13

4.2. Measures

The online questionnaire included all the key variables in the proposed research model: physical presence, social presence, concentration, perceived control, enjoyment, and purchase intention. In addition, there were three control variables: gender, age, and education. All the scales in this study were adapted from previous literature and used a 5-point Likert scale (ranging from 1 = "Strongly disagree" to 5 = "Strong agree"). In order to make them suitable for our research in China, we made necessary adaptation to the items. These scales were originally in English and were first translated into Chinese and then back into English by bilingual scholars to ensure equivalency before using in the questionnaire, following the commonly prescribed procedures [88].

Physical Presence. The items of physical presence were adapted from Barfield et al. [33]. A four-item scale was developed to assess physical presence in the current study. Sample items include "When shopping in live streaming, I felt as if I were shopping in a brick-and-mortar store" and "While I was shopping in live streaming, I felt as if I were in a real world created by the live streaming". The Cronbach's alpha for this measure was 0.80 in this study.

Social Presence. The items of social presence were adapted from Gunawardena [89]. Example items of the six-item measure include "There is a sense of human contact in live streaming shopping" and "There is a sense of sociability in live streaming shopping". The Cronbach's alpha for this measure was 0.84, with one item dropped for its low factor loading.

Flow. The items of flow were adapted from Koufaris [39]. This scale had 12 items that measure three dimensions of the flow: concentration, perceived control, and enjoyment. Sample items include "I was absorbed intensely in the live streaming shopping", "I felt everything was under control when I was shopping in live streaming", and "I found the live streaming shopping was enjoyable". The resulting Cronbach alphas for

these three dimensions in this study were 0.85, 0.81, and 0.87, respectively, all above the recommended level.

Purchase Intention. The three-item scale for consumers' purchase intention was adapted from Dodds [90]. Sample items include "It is very likely that I will buy the product", "I intend to buy the product", and "I would consider buying the product in future". The Cronbach's alpha for this variable was 0.83 in this study. For the full list of questionnaire items used in this study, please refer to the Appendix A.

4.3. Data Analysis and Results

We used AMOS 23.0 to conduct basic descriptive statistical testing and correlation analysis and to assess the validity of the constructs examined in this study [91]. To test the proposed hypotheses and the mediating roles of the flow, the SPSS process was used for related analyses. Table 3 shows the means, standard deviations, and correlations of all the variables.

Table 3. Mean, S.D., and correlations.

Variables	Mean	S.D.	1	2	3	4	5	6	7	8
1. Gender	1.62	0.49								
2. Age	2.39	0.63	−0.02							
3. Education	2.04	0.47	0.14 **	0.00						
4. Physical Presence	3.35	0.84	0.11 *	0.25 **	0.06					
5. Social Presence	3.42	0.80	0.12 *	0.25 **	0.11 *	0.77 ***				
6. Concentration	3.42	0.86	0.17 **	0.18 **	0.09	0.75 ***	0.69 ***			
7. Perceived Control	3.47	0.75	0.08	0.22 **	0.01	0.40 ***	0.42 ***	0.36 ***		
8. Enjoyment	3.67	0.82	0.25 **	0.19 **	0.10	0.73 ***	0.73 ***	0.78 ***	0.38 ***	
9. Purchase Intention	3.45	0.88	0.23 **	0.23 **	0.11 *	0.71 ***	0.70 ***	0.74 ***	0.76 ***	0.76 ***

Notes: $N = 384$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$ (two-tailed).

4.3.1. Common Method Bias

Considering that all the data were collected using the same approach at the same time, the common method bias might be a problem and may affect the validity of the research [91]. To check for the problem of possible common method bias, we conducted Harman's single factor test and the result showed that the maximum variance explained by any single factor in this study was 26.37%, which is less than the threshold value [91]. In addition, following the procedures recommended by Podsakoff et al. [91], we put a common method factor into the CFA model and the result showed that the CFI changed from 0.948 to 0.950, TLI changed from 0.939 to 0.942 and RMSEA changed from 0.055 to 0.053, which indicated that the fitting indices of the new model did not improve a lot. Thus, the common method bias does not seem to be a major problem in this study. We also calculated VIF (variance inflation factor) to check the potential problem of multicollinearity, and none of the VIFs was greater than 5, indicating that multicollinearity is not a major problem in this study.

4.3.2. Validity Test

Confirmatory factor analysis (CFA) was used to assess the convergent validity and discriminant validity. AMOS 23.0 was first used to test whether the six-factor model is a good fit with our data. The results show that, compared with all the alternative models shown in Table 4, the six-factor model is the best fit with the data, which supports the proposed research model for analysis in this study (please see Table 4). The criteria for convergent validity require the AVE (Average Variance Extracted) to be greater than 0.5, standardized factor loading of all items not less than 0.5, and composite reliability (CR) not

less than 0.7. The AVE values of all concepts in this study are above 0.5, all standardized factor loadings are above 0.60, and the CR are all above 0.7. The results thus support the convergent validity (please see Table 5). The discriminant validity was measured using the chi-square difference as recommended by Zait and Bertea [92]. First, we created a model in which two constructs did not correlate and conducted CFA. Then, we created a model in which two constructs correlated and performed the CFA. Finally, we performed the chi-square difference tests. Based on the prescribed advice [92], if the result of the difference test is significant ($p < 0.05$), then the two constructs have discriminant validity. Table 6 reports the results of these analyses, which indicates the measurement model has good discriminant validity.

Table 4. Confirmatory factor analysis results.

Models	NFI	IFI	TLI	CFI	χ2/df	RMSEA	DF
One-factor model	0.812	0.850	0.835	0.849	4.189	0.091	252
Two-factor model A (PP + SP + C+PI + E, PI)	0.818	0.856	0.841	0.855	4.070	0.090	251
Two-factor model B (PP + SP, C + PC + E+PI)	0.827	0.866	0.852	0.865	3.860	0.086	251
Three-factor model A (PP + SP, C + PC + E, PI)	0.832	0.871	0.856	0.870	3.772	0.085	249
Four-factor model A (PP + SP, C, PC + E, PI)	0.844	0.881	0.865	0.881	3.723	0.084	224
Four-factor model B (PP, SP, C + PC + E, PI)	0.835	0.873	0.857	0.872	3.771	0.085	246
Five-factor model A (PP + SP, C, PC, E, PI)	0.891	0.945	0.937	0.945	2.211	0.056	242
Five-factor model B (PP, SP, C, PC + E, PI)	0.845	0.883	0.866	0.883	3.584	0.082	242
Six-factor model	0.908	0.948	0.939	0.948	2.175	0.055	260

Notes: N = 384, PP = physical presence, SP = social presence, C = concentration, PC = perceived control, E = Enjoyment, PI = purchase intention.

Table 5. Convergent validity results.

Variables and Measurement Items	Standardized Loading	CR	AVE
Social Presence			
SP1	0.750	0.834	0.503
SP3	0.750		
SP4	0.702		
SP5	0.669		
SP6	0.669		
Physical Presence			
PP1	0.728	0.802	0.503
PP2	0.726		
PP3	0.676		
PP4	0.706		

Table 5. *Cont*.

Variables and Measurement Items	Standardized Loading	CR	AVE
Concentration			
C1	0.774	0.855	0.597
C2	0.785		
C3	0.794		
C4	0.736		
Perceived Control			
PC1	0.800	0.811	0.521
PC2	0.622		
PC3	0.813		
PC4	0.630		
Enjoyment			
E1	0.788	0.869	0.624
E2	0.712		
E3	0.825		
E4	0.830		
Purchase Intention			
PI1	0.824	0.831	0.621
PI2	0.773		
PI3	0.766		

Notes: N = 384, PP = physical presence, SP = social presence, C = concentration, PC = perceived control, E = enjoyment, PI = purchase intention.

Table 6. Discriminant validity results.

Relationship	Model	Chi-Square	df.	Probability Level	c1−c2	df1−df2
PP & SP	Model 1	416.7	27	0.000	343.5	1
	Model 2	73.2	26	0.000		
SP &C	Model 1	324.4	27	0.000	251.8	1
	Model 2	72.6	26	0.000		
SP & E	Model 1	382.7	27	0.000	313.5	1
	Model 2	69.2	26	0.000		
SP & PI	Model 1	307.3	20	0.000	264.5	1
	Model 2	42.8	19	0.000		
PP &C	Model 1	354.4	20	0.000	298	1
	Model 2	56.4	19	0.000		
PP & E	Model 1	304.1	20	0.000	286.8	1
	Model 2	17.3	19	0.000		
PP & PI	Model 1	281.1	14	0.000	270.8	1
	Model 2	10.3	13	0.000		
PP & PC	Model 1	147.4	20	0.000	73.9	1
	Model 2	73.5	19	0.000		
SP & PC	Model 1	184	27	0.000	75.1	1
	Model 2	108.9	26	0.000		

Table 6. *Cont.*

Relationship	Model	Chi-Square	df.	Probability Level	c1−c2	df1−df2
	Model 2	108.9	26	0.000		
C & PC	Model 1	144.3	20	0.000	56.9	1
	Model 2	87.4	19	0.000		
E & PC	Model 1	153.8	20	0.000	69.4	1
	Model 2	84.4	19	0.000		
PC & PI	Model 1	154.2	14	0.000	77.3	1
	Model 2	76.9	13	0.000		
C & E	Model 1	396.9	20	0.000	341.6	1
	Model 2	55.3	19	0.000		
C & PI	Model 1	331.5	14	0.000	287.2	1
	Model 2	44.3	13	0.000		
E & PI	Model 1	371.7	14	0.000	348.6	1
	Model 2	23.1	13	0.000		

Notes: N = 384, PP = physical presence, SP = social presence, C = concentration, PC = perceived control, E = enjoyment, PI = purchase intention.

4.3.3. Hypothesis Test

SPSS Process was used to test the hypotheses, as shown in Table 7. The results show that physical presence and social presence were positively related to concentration (β = 0.75, $p < 0.001$; β = 0.73, $p < 0.001$; Model 1 and Model 2 in Table 7), which supports H1a and H1b. When physical presence and concentration were considered as independent variables and perceived control as a dependent variable, physical presence and concentration were positively related to perceived control (β = 0.24, $p < 0.01$; β = 0.12, $p < 0.05$, respectively; Model 3 in Table 7), which supported H2 and H4. The results also showed that both social presence and concentration were positively related to enjoyment (β = 0.38, $p < 0.001$; β = 0.47, $p < 0.001$; Model 4 in Table 7), which supports H3 and H5. Moreover, the results also indicated that concentration, perceived control, and enjoyment were all positively related to consumers' purchase intentions as predicted (Model 5, Model 6, and Model 7 in Table 7), which supports H6, H7, and H8.

Table 7. Results of regression analyses.

Variables	Concentration		Perceived Control	Enjoyment	Purchase Intention		
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Gender	0.15 *	0.16 *	0.04	0.19 *	0.20 *	0.13 *	0.10
Age	−0.00	0.02	0.05	0.01	0.07	0.08	0.08
Education Level	0.07	0.01	−0.03	−0.01	0.06	0.03	0.05
Physical Presence	0.75 ***		0.24 **		0.34 ***		
Social Presence		0.73 ***		0.38 ***		0.25 **	
Concentration			0.12 *	0.47 ***	0.44 ***	0.30 ***	0.29 ***
Perceived Control					0.12 *		0.11 *
Enjoyment						0.36 ***	0.38 ***

Notes: N = 384, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$ (two-tailed).

The SPSS Process Model 6 [93] was then used with bootstrapping to analyze the mediating effects of concentration, perceived control, and enjoyment on the impact of

presence on consumers' purchase intentions. We first tested the mediating effects of concentration and perceived control on the relationship between physical presence and purchase intentions (gender, age and education as control variables). The bootstrapping results indicate that the indirect effect of concentration as a mediating variable is 0.33 (95% CI = [0.2450, 0.4161]). The indirect effect of perceived control as a mediating variable is 0.03 (95% CI = [0.0054, 0.0616]). The indirect effect of concentration and perceived control together as mediating variables is 0.01 (95% CI = [0.0001, 0.0307]). All the indirect effects add up to 0.36 (95% CI = [0.2825, 0.4518]). Therefore, the proposed chain mediating effects of concentration and perceived control on the relationship between physical presence and consumers' purchase intentions are supported (please see Table 8).

Table 8. Results on Indirect effect for different paths.

Path	β_a	β_b	Indirect Effect	95% Confidence Interval
PP→C→PI	0.75	0.44	0.33	(0.2450, 0.4161)
PP→PC→PI	0.24	0.11	0.03	(0.0054, 0.0616)
PP→C→PC→PI			0.01	(0.0001, 0.0307)
SP→C→PI	0.73	0.30	0.22	(0.1341, 0.3148)
SP→E→PI	0.38	0.36	0.14	(0.0872, 0.1959)
SP→C→E→PI			0.12	(0.0817, 0.1753)

Notes: N = 384, PP = physical presence, SP = social presence, C = concentration, PC = perceived control, E = enjoyment, PI = purchase intention, β_a = the regression coefficient of the mediator variable with the antecedent variable, β_b = the regression coefficient of the criterion variable with the mediator variable.

We then tested the mediating effects of concentration and enjoyment on the relationship between social presence and purchase intentions (gender, age, and education as control variables). The bootstrapping results indicate that the indirect effect of concentration as a mediating variable is 0.22 (95% CI = [0.1341, 0.3148]). The indirect effect of enjoyment as a mediating variable is 0.14 (95% CI = [0.0872, 0.1959]). The indirect effect of concentration and enjoyment together as mediating variables is 0.12 (95% CI = [0.0817, 0.1753]). All the indirect effects add up to 0.48 (95% CI = [0.3924, 0.5743]). Hence, the proposed chain mediating effects of concentration and enjoyment on the relationship between social presence and consumers' purchase intentions are also supported (please see Table 8). The final model is shown in Figure 2.

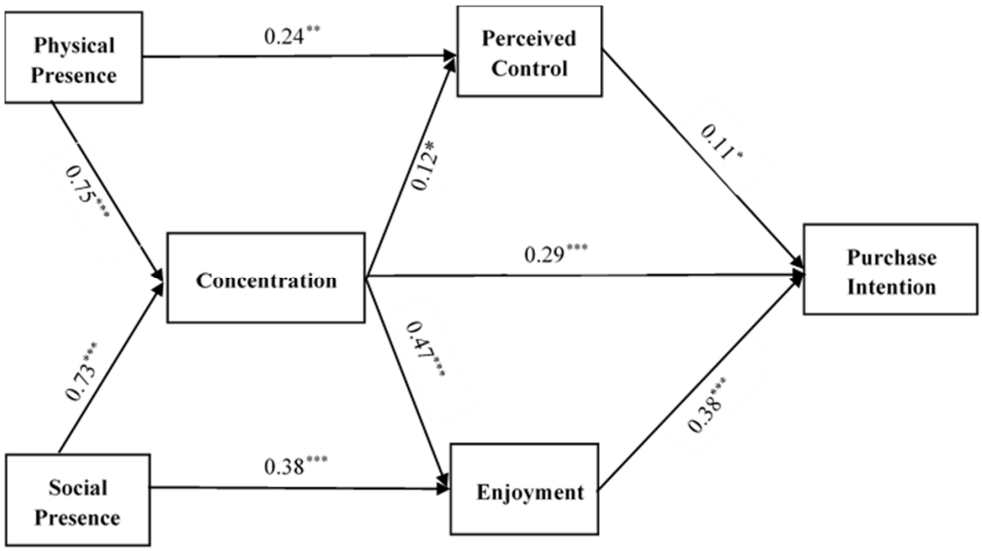

Figure 2. Regression results on presence and purchase intention in livestream shopping. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$ (two-tailed).

5. Discussion and Implications

This study is to use the flow theory to explore the impact of feeling of presence on consumers' purchase intentions in livestream shopping. The flow-based research model provides an integrated picture on the effects of presence on consumers' purchase intentions, and further on the role of flow experience in the relationship between presence and purchase intentions. The empirical results reveal different mechanisms through which physical presence and social presence motivate consumers to indulge in livestream shopping and make decisions to purchase.

More specifically, our study shows that both dimensions of presence have positive impacts on consumers' purchase intentions in livestream shopping. The results show that social presence has a positive effect on consumers' purchase intention, similar to the findings in previous studies [16,94]. In addition, our study shows that physical presence also has a positive impact on consumers' purchase intentions with concentration as a mediator, confirming the important role of physical presence in livestream shopping and is consistent with Pelet's [46] research findings on flow experiences in social media context.

In addition, this study shows that physical presence and social presence affect consumers' purchase intentions through different mechanisms. Physical presence positively affects consumers' purchase intention through concentration and perceived control while social presence helps improve consumers' purchase intention through concentration and enjoyment. Therefore, this flow-based model provides a clearer picture on the relationship between presence and consumers' purchase behaviors in livestream shopping.

5.1. Theoretical Implications

This study can help enrich marketing research in particular online marketing in the age of digitalization when more marketers and consumers have relied on mediated environment to sell and buy products. First, this study develops an integrated model that incorporates the feeling of presence and the flow theory to explore the dynamic process of livestream shopping. While livestream shopping is fast emerging, relatively few studies have provided an integrated model to examine the underlying reasons why consumers are so obsessed with this form of shopping activities [7,8,35]. This study contends that the feeling of presence can help consumers gain the flow experiences wherein consumers are so absorbed in the virtual environment that concentration and perceived control as well as enjoyment are generated, which then drives consumers to make purchase decisions, a flow-based process on consumers' experiences in livestream shopping. The empirical data collected from Chinese consumers in livestream shopping substantiated the proposed research model. As a result, this study can advance the literature on consumers' purchase intention in livestream shopping and consumer behaviors in general with a more robust theory. Second, our study shows that both dimensions of presence including social presence and physical presence positively affect consumers' purchase intentions. While existing research has proved that social presence has an impact on consumers' purchase intentions [16,17,35], few studies have examined the effect of physical presence on consumers' purchase intentions [7], not to mention in the context of livestream shopping. This study shows physical presence is also positively related to consumers' purchase intention, but with a different path. Thus, this study sheds new lights on presence and its impact on consumer behaviors in interactive marketing.

Third, this study examines the mediating roles of all three dimensions of flow experience including concentration, perceived control, and enjoyment in the relationship between presence and consumers' purchase intention. The proposed research model helps debunk the black box on how presence affects purchase intentions [7,13,95]. Although some studies on livestream shopping have suggested that flow plays an important role in consumers' purchase intentions [7], these studies only treated flow as a general variable while ignoring that it is a multi-dimensional construct with each dimension playing different roles. Based on the research of Koufaris [39], this study divides the flow into three dimensions—concentration, perceived control, and enjoyment, and then investigates their

unique mediating effects on presence and consumers' purchase intention in the context of livestream shopping. This study thus bridges the gap in existing literature on livestream shopping and enhances our understanding of the role of flow in this dynamic process. Moreover, previous studies often apply the flow theory to online gaming [96–98], online shopping [99,100], and website design [29,30,101]. Few have used this theory to examine livestream shopping. This study incorporates the feeling of presence and the flow theory to explore livestream shopping for a better understanding of consumer behaviors in a mediated environment, and thus helps broaden the research horizon for flow theory and presence in virtual communities.

5.2. Practical Implications

This study also has important practical implications on how to engage consumers and to increase their purchase intention in the increasingly digitalized consumer market, especially when the COVID-19 pandemic has driven more consumers to rely on enriched online experiences to make shopping decisions. The findings of this study point to a new marketing strategy where consumers' participation can be encouraged by improving the feeling of presence in order to retain and develop customer base. First, a mediated environment that conveys enough information with real-time updates and social elements in the interactions can greatly increase the feeling of physical presence [47,102,103]. When consumers are actively involved in such a virtual world, physical presence is likely to be generated [47,102]. Therefore, livestream marketers can engage consumers by constantly showing products in front of live cameras and by describing products in meticulous detail to attract consumers. In addition, physical presence can also be enhanced by representational fidelity in the virtual world, such as realistic display of the environment and smooth change of views [104]. The livestream studio can be so arranged to resemble the layouts of offline stores to make consumers feel like they are offline shopping, a perceptual illusion, which can generate more feelings of physical presence. Social presence is the feeling of being with others in a virtual environment which requires psychological participation including intimacy and immediacy. Intimacy and immediacy can be enhanced by continuous interactions and quality communications [95,105]. As a result, livestream anchors can encourage consumers to ask questions and also respond to their questions in a timely manner so as to shorten the psychological distance with consumers and enhance interactions with them.

Second, this study discovers that flow experiences mediate the relationship between presence and consumers' purchase intentions. Since concentration is one of the most important dimensions of flow, livestream anchors can improve consumers' concentration by holding unscheduled flash sales or other events in the process of livestream to attract consumers' attention. Moreover, marketers or livestream anchors can improve consumers' perceived control by fast response to consumers' questions to make consumers feel valued or increase consumers' enjoyment by providing a happy hour such as lucky draws or handing out red envelopes from time to time. The key to the flow-based marketing strategy in the virtual world is to actively engage consumers to improve their feelings of presence so that they could develop flow experiences to concentrate, form a sense of control, and further enjoy these activities and then make purchase decisions.

5.3. Limitations and Future Research Directions

This study is exploratory and thus has its limitations and caution needs to be excised in generalizing the findings. First, the sample used in this study is not a random sample. We can only analyze the data from the people who responded to our survey and, consequently, it is possible that the people who chose to complete the survey are different from those who did not respond to the survey, a self-selection bias. The sample size is also small compared with the large number of livestream users in China. Future research should use a randomized sample and also a larger sample to increase the generalizability. Second, this study only surveyed Chinese consumers, while livestream shopping has become popular in many other countries. Future research could replicate this study and test the proposed model

with data from consumers in other countries to investigate its applicability in other cultural contexts. For example, previous research using European consumers has explored the effects of influencer endorsement on consumer engagement and online store performance and its results show that influencer endorsement negatively moderates the effects of consumer engagement [8]. This is very interesting, as livestream shopping in China often uses influencer endorsement to promote products and has achieved tremendous positive impact. In fact, many livestream anchors are themselves influencers. Future research should explore this intriguing difference. Third, livestream shopping is just one of the many forms of livestream activities and livestream activities include livestream games, livestream concerts, livestream tourism, and other cyberspace activities. More research is encouraged to explore the impact of presence and flow experiences on participants' motivation and behaviors in other forms of livestream. In addition, the study lacks the consideration of moderating variables. Because we focus on the mediating effects of the flow state on the relationships between physical and social presence and purchase intentions, we did not specify boundary conditions. Future research should consider possible moderating variables to examine boundary conditions in this dynamic process for a more nuanced understanding.

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Appendix A

Variables	Items	Sources
Physical Presence	When shopping in live streaming, I felt as if I was shopping in a brick-and-mortar store	Barfield, W., Zeltzer, D., Sheridan, T.B., and Slater, M., Presence and performance within virtual environments. In Barfield, W., and Furness III, T.A. (eds.) *Virtual Environments and Advanced Interface Design*, 1995, Oxford, Oxford University Press. [33]
	While I was shopping in live streaming, I felt as if I were in a real world created by the live streaming	
	When shopping in live streaming, although my body was in the room, I felt that my mind was inside the world created by live streaming.	
	While I was shopping in live streaming, I felt the products presented by the anchor were right in front of me.	
Social Presence	I felt a sense of sociability when shopping in live streaming.	Gunawardena, C. N., and Zittle, F. J., Social presence as a predictor of satisfaction within a computer-mediated conferencing environment. *American Journal of Distance Education*, 1997, 11(3), 8–26. [89]
	I felt a sense of human warmth when shopping in live streaming.	
	I felt a sense of human contact when shopping in live streaming.	
	I was aware of the presence of anchor and other consumers when shopping in live streaming.	
	The anchor and other consumers were aware of the presence of me when shopping in live streaming.	
	I was able to communicate with anchor and other consumers when shopping in live streaming.	

Variables		Items	Sources
Flow	Concentration	When shopping in live streaming, I was absorbed intensely in the activity.	Koufaris, M., Applying the technology acceptance model and flow theory to online consumer behavior. *Information Systems Research*, 2002, 13(2), 205–223. [39]
		When shopping in live streaming, my attention was focused on the activity.	
		When shopping in live streaming, I concentrated fully on the activity.	
		When shopping in live streaming, I was deeply engrossed in the activity.	
	Perceived Control	When shopping in live streaming, I felt confused.	
		When shopping in live streaming, I felt calm.	
		When shopping in live streaming, I felt in control.	
		When shopping in live streaming, I felt frustrated.	
	Enjoyment	When shopping in live streaming, I found it interesting.	
		When shopping in live streaming, I found it enjoyable.	
		When shopping in live streaming, I found it exciting.	
		When shopping in live streaming, I found it funny.	
Purchase Intention		I will likely buy the products recommended in the live streaming shopping.	Dodds, W. B., Monroe, K. B., and Grewal, D., Effects of price, brand, and store information on buyers' product evaluations. *Journal of Marketing Research*, 1991, 28(3), 307–319. [90]
		I would recommend live streaming shopping to my friends.	
		I would prefer to use the products recommended in the live streaming shopping.	

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