Computers in Human Behavior 75 (2017) 594–606

Contents lists available at ScienceDirect

Computers in Human Behavior

journal homepage: www.elsevier.com/locate/comphumbeh

Full length article

Why do audiences choose to keep watching on live video streaming platforms? An explanation of dual identification framework

Mu Hu*, Mingli Zhang, Yu Wang

School of Economics and Management, Beihang University, No. 37 Xueyuan Road, 100191 Beijing, China

ARTICLE INFO

Article history:
Received 7 December 2016
Received in revised form
4 June 2017
Accepted 5 June 2017
Available online 6 June 2017

Keywords:
Live video streaming
Social identity theory
Parasocial interaction
Self-congruity
Co-experience

ABSTRACT

Live video streaming has been a global economic and social phenomenon in recent years. Many streaming platforms such as Twitch and YouTube Live have been founded and demonstrated unprecedented growth across the world. Yet, researchers have paid insufficient attention to understanding the massive participation behavior exhibited by live video streaming audiences. Based on social identity theory, this paper aims to explain audiences' continuous watching behavior intention via a dual identification framework including identifications with streaming broadcasters and audience groups. Analysis of data collected from two live streaming platforms in mainland China indicates that audiences' identification with broadcasters and audience groups are positively associated with their continuous watching intention. Broadcaster identification is driven by individual experience including experience of parasocial interaction, actual and ideal self-congruity, whereas group identification is enhanced by co-experience consisting of participation, cognitive communion, and resonant contagion. In addition, live streaming genres partially moderate the impact of identification on continuous watching intention. Theoretical and practical implications as well as limitations and suggestions for future research are provided.

1. Introduction

In the decade, Internet users have become keen on communication through various social media services such as virtual communities, SNS websites, and blogs (Kaplan & Haenlein, 2010). Recently, the forms of computer-mediated communications have been extended beyond text and image to audio and video as results of the revolution of cutting edge internet technologies. In specific, a unique form of social media has emerged, and been recognized as live video streaming platforms. As a special combination of multiple media forms, live streaming allows individuals to publicly broadcast live video streams, accompany with a shared chat room for user communication (Hamilton, Garretson, & Kerne, 2014). Generally, a typical live video streaming activity involves a streamer/broadcaster who uploads his/her real-time video and audio content including video games, talent performance, daily life, or whatever he/she expects to share. Viewers/audiences on the streamer's channel can comment and communicate with each other via text-based chat room function. Meanwhile, the streamer also engages in dialogues and interactions with his/her audiences while broadcasting.

Live streaming activity has witnessed its prosperity since the availability of diverse platforms such as Twitch (a famous video game streaming website) and YouTube Live (live streaming service of YouTube) (Smith, Obrist, & Wright, 2013). For instance, Twitch made up 1.8% of total US Internet traffic and ranked at the fourth during peak periods in 2014 (Pires & Simon, 2015). Twitch also announced it had more than 1.5 million broadcasters and over 100 million visitors per month in 2015 (Needleman, 2015). It seems that more and more people are becoming immersed in this live video watching. Hence, we can't help wondering what the rationale is behind audiences' real-time video watching behavior on live streaming platforms.

Compared with flourishing development in practice field, academic realm has paid unequal attention to live video streaming activity. Users' continuance intention on other type of social media, such as virtual communities, social networks, has received sufficient attention in academic domain (e.g. Lin, Fan, & Chau, 2014; Zheng, Zhao, & Stylianou, 2013). However, most studies in computer science take a technological approach to optimize streaming network systems, or try to demonstrate the characteristics of

* Corresponding author.
E-mail address: humu1990@foxmail.com (M. Hu).

http://dx.doi.org/10.1016/j.chb.2017.06.006
0747-5632/

streams on some famous platforms. (e.g. Barekatain et al., 2015; Kaytoue, Silva, Cerf, Meira, & Raïssi, 2012; Pires & Simon, 2015). Extant literature still lacks a comprehensive framework to explain audiences' continuous watching behavior. Only limited studies have shed light on this question. On one hand, the presence of co-viewers and sense of community within streaming channels have been regarded as necessary elements; on the other hand, frequent interactions between broadcasters and audiences have been emphasized in attracting and maintaining audiences as well (Hamilton et al., 2014; Lim, Cha, Park, Lee, & Kim, 2012; Smith et al., 2013). Thereby, audiences' continuous watching intention may be explained in a social-psychological approach which considers both audience-broadcaster tie and audience-other audiences tie.

In fact, the nature of live video streaming activity not only offers a real-time watching experience for audiences, but also provides opportunities to communicate and socialize among broadcasters and other co-viewers. These interactions in cyber contexts may promote the development of audiences' self-definition process and further identifications with various referents (Hall-Phillips, Park, Chung, Anaza, & Rathod, 2016). Also, the psychological bond of a social referent is an important predictor of loyalty behavior within virtual communities (Badrinarayanan, Sierra, & Martin, 2015). Thus, incorporating the identification concept in current study may be helpful to explain the study question.

Drawing on previous research, this study aims to develop and empirically test an audiences' social identification framework based on social identity theory. Firstly, a dual identification model, which depicts identifications with broadcasters and audience groups, is proposed to explain users' continuous watching intention. Secondly, unlike most prior studies which take identification for granted without considering its formation in computer-mediated communications (Shen & Khalifa, 2015, pp. 87–101; Tuškej, Golob, & Podnar, 2013), we expect to carefully examine the antecedents of identification process. Identification can be either deduced from collective identity or inter-member interaction (Postmes, Spears, Lee, & Novak, 2005). Previous studies mainly take the former perspective to explore the antecedents of identity attractiveness that leads to identification (e.g. Bhattacharya & Sen, 2003). However, in consideration of the interactive nature on live streaming platforms, perceived identity information is mainly rooted in interaction process among broadcasters and audiences. Audiences' identifications with various referents may result from interactive experience between members. Hence, we intend to inspect the formation of audiences' identifications from the perspective of user experiences that generate from interactions within audience-broadcaster tie and audience-other audiences tie. Current study constructs two categories of experiences to describe audiences' sensations and feelings regarding to live video consumption. Specifically, parasocial interaction experience and self-congruity have been conceptualized as the individual experience resulting from interaction with broadcasters. Participation, cognitive communion, and resonant contagion constitute the co-experience which is introduced to measure experiences emerging during interaction with other audiences. Finally, to further understand the potential influence of streaming content genres in proposed dual identification framework, a sub-group comparison involving two popular stream categories (video games & talent shows) is conducted.

2. Literature review and hypothesis development

2.1. Theoretical background: social identity theory

Proposed by Tajfel and Turner (1979), social identity theory posits that people hold various social identities along with their individual identities. It is assumed that our self-concepts are partially defined by certain social groups where we obtain the sense of oneness or belongingness, as well as involving values (Ashforth & Mael, 1989). Hence, people tend to classify themselves into various social categories that they identify with, and develop social identifications which depict the oneness or belongingness to certain social categories (Ashforth & Mael, 1989). This social identification process is mainly served as a self-defining way to achieve self-consistency, self-esteem, and self-enhancement (Bhattacharya & Sen, 2003). In consequence, to maintain their favored social identities, people's deep identifications with groups, organizations or other human aggregates lead to in-group favoritism and corresponding results such as enhanced commitment, intragroup cohesion, product and service preference, and group support behaviors (Ashforth & Mael, 1989; Bhattacharya & Sen, 2003; Trepte, 2006).

Based on social identity theory, social identification concept has been widely applied in social media research, and conceptualized into specific forms such as organizational identification, community identification, etc. (e.g. Helm, Renk, & Mishra, 2016; Luo, Zhang, Hu, & Wang, 2016). Recently, studies on virtual communities and social networks have verified the crucial role of community identification of members in showing positive outcomes such as consumption behaviors, generating positive word-of-mouth, and continuous usage intention (Algesheimer, Dholakia, & Herrmann, 2005; Badrinarayanan et al., 2015; Helm et al., 2016; Hsu, Chih, & Liou, 2015; Yoshida, Gordon, Heere, & James, 2015). In fact, live video streaming service can be regarded as a special type of video-based social media, indicating that social identity theory and social identification concept may be effective to explain members' continuous participation intention.

2.2. Social identification on live video streaming platforms

People often remain multiple identities in varying salience (Kleine, Kleine, & Kernan, 1993). Belén del Río, Vazquez, and Iglesias (2001) further argue that identification can be distinguished into group-based identification and individual-based identification. In current study, two relevant social referents, i.e. audiences and broadcasters, coexist within live streaming platforms. Consequently, members' social categorization process may results in their identifications with audience groups and broadcasters respectively.

Drawing on related works, we construct the audience group identification as psychological attachment, emotional and social bonds a member shares within an audience group (Algesheimer et al., 2005; Füller, Matzler, & Hoppe, 2008; Hall-Phillips et al., 2016). Users from the same audience group interact with each other mainly via text-based dialogues (Hamilton et al., 2014). During their communication, audiences can exchange their ideas and thoughts about streams, broadcasters, and even issues unrelated to stream contents. Meanwhile, audiences will subtly deliver their identity-related information and perceive others' identities in a form of collective group identity. In consequence, a member may identify with other audiences if he/she perceives the fit of values and beliefs between the group and him/herself. According to Keh and Xie (2009), identification is effective in promoting commitment to long-term relationship maintenances. Badrinarayanan et al. (2015) also indicate that identification with other members will lead to sustained participation and interaction on virtual communities. Therefore, we infer that, with the increased identification of audience group, a member will feel stronger attachment to the group and choose to maintain their intragroup connections by continuous watching.

H1. Identification with an audience group is positively related to continuous watching intention.

Live video streaming service distinguishes itself from other social media forms via the existence of broadcasters/streamers (Smith et al., 2013). Accordingly, the individual-based identification aspect is manifested as identification with broadcasters on live streaming platforms. Kelman (1961) defines this kind of identification with an individual as "classical identification" which means a person "attempts to be like or actually to be the other person", and desires to "appease, emulate, and vicariously gain the qualities of others". Identification with a person is similar to identification with a group (Ashforth & Mael, 1989). However, personal identification incorporates other essences including liking and admiration, perceived similarity, attitudes and beliefs adoption (Basil, 1996; Brown & de Matviuk, 2010; Brown, 2015; Katz & Liebes, 1990). Accordingly, a viewer's identification with a broadcaster takes place when a viewer takes a broadcaster as self-referential in belief, personality, competence, and other aspects.

According to recent studies on personal identifications, people tend to regard identified individuals as role model, and incline to maintain reciprocal relationships (Ashforth, Harrison, & Corley, 2008; Zhang, Liao, & Yuan, 2016; Zhu, He, Treviño, Chao, & Wang, 2015). On one hand, a viewer's identification with broadcasters may also trigger the intention to maintain longer relationship and loyalty as a result of role model effect. A viewer may admire and worship a streamer because of his/her attitudes and values, special talents, or even personal charisma. Pervious study implies that it is streamers' personalities that exert vital influence on viewers' willingness to stay (Hamilton et al., 2014). On the other hand, live streaming activity is characterized as a personal branding practice, establishing broadcasters' idiosyncratic online identities to attract followers (Tang, Venolia, & Inkpen, 2016). Studies have validated that positive brand outcomes such as brand loyalty and commitment are direct responses of brand identification (Stokburger-Sauer, Ratneshwar, & Sen, 2012; Tuškej et al., 2013). Therefore, we infer that a viewer's identification with a broadcaster may produce a sustained, long-term preference for the broadcaster's broadcast channel, i.e. continuous watching intention.

H2. Identification with a broadcaster is positively related to continuous watching intention.

2.3. Individual experience with broadcasters as antecedents of broadcaster identification

Interaction with a social referent has been recognized as an important factor to develop social identification (Ashforth & Mael, 1989). However, this interaction needs not to be interpersonal and reciprocal (Trepte, 2006). Considering current context, the interaction between a broadcaster and an audience may exhibit in a unidirectional and one-to-many pattern, especially when audience size exceeds a certain amount. Here we expect to explain the nature of interaction between a broadcaster and a viewer with the concept of parasocial interaction.

Proposed by Horton and Richard Wohl (1956), parasocial interaction is described as an illusive sense of mutual awareness and intimacy with media personas (e.g. celebrities, news hosts, characters). People believe they are engaged in a face-to-face interaction without technical possibility of reciprocal communication (Houlberg, 1984). People in parasocial relationship often report the feeling of intimacy and closeness and define media personas as "real friends" (Stern, Russell, & Russell, 2007; Xiang, Zheng, Lee, & Zhao, 2016). In turn, this friendship-like relationship will increase personal attachment, relationship investment, and loyalty toward media figures (Labrecque, 2014; Xiang et al., 2016). Recently, studies have expand the scope of parasocial interaction from mass media into online context (e.g. Labrecque, 2014; Powell, Richmond, & Williams, 2011), especially in social media practices such as micro-blogs and Social Network Sites (e.g. Cohen & Tyler, 2016; Lee & Oh, 2012).

Interactions on live streaming platforms may possess the characteristic of parasocial interaction. The nature of social media implies viewers can follow another's statues without reciprocal responsibility (Hargittai & Litt, 2011). However, the sense of parasocial interaction can be triggered if media performers perceive the existence of audiences, and adapt the conversational style or body gestures to create an illusion of two-sided communication (Dibble, Hartmann, & Rosaen, 2016). Broadcasters can adopt an interactive style in terms of addressing questions, show gratitude to praises, and self-disclosure in practice. Consequently, viewers who experience parasocial interactions may regard streamers as intimate friends because they pay attention to viewers' suggestions and care for the viewers' feelings. Studies have suggested that viewers are inclined to be more emotionally attached to and identified with media personas that provide richer experience of parasocial interaction (Brown & Basil, 2010; Brown, 2015; Frederick, Lim, Clavio, & Walsh, 2012). In the same vein, we infer that experience of parasocial interaction a viewer perceived may increase the identification with the broadcaster.

H3. Experience of parasocial interaction is positively related to broadcaster identification.

Self-congruity is another factor that may influence broadcaster identification. Introduced by Sirgy (1982), self-congruity is defined as the extent to which the images of an object and a person are perceived as matching. People prefer to consume brands possessing the personalities which are compatible with their own self-concepts. On one hand, a person tries to behave in a way which is consistent with his/her actual self-image and for self-expression; on the other hand, he/she also expect to build up ideal self-image that potentially extend and enhance his/her real self (Kressmann et al., 2006). These dual aspects of self-congruity are defined as actual self-congruity and ideal self-congruity (Sirgy, 1982). In marketing domain, recent studies have widely applied self-congruity concept to explain customer-brand relationship, brand attitudes, brand loyalty, and consequent purchase intention (Aguirre-Rodriguez, Bóveda-Lambie, & Miniard, 2015; Koo, Cho, & Kim, 2014; Roy & Rabbanee, 2015). Meanwhile, the application of self-congruity has been extended from brand research to more general referents such as media personas (e.g. celebrities, bloggers) (Boon & Lomore, 2001; Thomson, 2006; Wang, Hsu, Huang, & Chen, 2015).

Live streaming activities provide immediate opportunities and solid technical support for self-expression (Tang et al., 2016). Broadcasters can manage their own self-images directly in various ways such as articulating their interests and attitudes to life, showing talents or skills. According to social identity theory, identification processes as a two step self-defining way to first preserve integrity of self image, and later to reach self-enhancement and self-esteem (Bhattacharya & Sen, 2003; Tajfel & Turner, 1979). On one hand, the aspiration for self-consistency of viewers can be satisfied if they perceive attitude similarity and like-mindedness of streamers, thus creating the sense of actual self-congruity. On the other hand, the need for self-esteem can be possibly appeased when viewers reflect their ideal selves. Viewers may worship broadcasters and regard them as role models, if the broadcasters possess special skills and abilities, or have achieved goals that the viewers are pursuing. Several studies also imply that self-congruity affects relationship persistence, and leads to identification with referents (Tuškej et al., 2013; Wang et al., 2015). Drawing on these findings, we infer that a viewer's perceptions of actual and ideal self-congruity toward a broadcaster on live streaming platforms will increase his/her identification with the broadcaster.

H4. Actual self-congruity is positively related to broadcaster identification.

H5. Ideal self-congruity is positively related to broadcaster identification.

2.4. Co-experience with other audiences as antecedents of group identification

The theory of socially shared cognition indicates that sharing of experience per se in social environments contributes to the entirety of individual experience (Brewer, 1991). Introduced by Battarbee (2003a, 2003b), co-experience is defined as the experience that users co-create in social interaction where participants share their feelings and affections regarding to their consumption practices. The conceptualization of co-experience integrates sharing of experiences between users of a product or service into the whole consumption experience. Thereby, it's the seamless combination of user experience in products and social interaction (Battarbee, 2003b). In fact, communication has been considered as a necessity in the creation of co-experience (Battarbee, 2003a). Drawing on this view, the co-experience of viewers on live streaming platforms may emerge via the communication within the audience-other audience tie.

To understand the influence of co-experience concretely and empirically, we adopt the constructs of co-experiences proposed by Lim et al. (2012). Three dimensions including participation, cognitive communion, and resonant contagion are referred to depict audiences' co-experience on live streaming platforms. According to Lim et al. (2012), participation, as a user experience, is the perception of partly contributing to the whole content that all users experience together; cognitive communion is the perception that a viewer shares the same cognitive level with others during their communication; resonant contagion is the extent to which a viewer's behavior can influence and be influenced by others.

Users co-create experiences and values for themselves through participation on social media (Dholakia, Bagozzi, & Pearo, 2004; Nambisan & Baron, 2009; Wang, Chan, & Yang, 2013). Specifically, the entirety of live streaming content is not merely provided by broadcasters alone. The contributions from multi-type audiences complement the whole experience of watching streaming contents, and differentiate live streaming from consuming traditional television programs (Smith et al., 2013). Viewers' participation may contribute to streaming activities in two aspects. Firstly, audiences' activities per se compose part of the streaming contents. Plenty of platforms allow more directly presented patterns of audience activities via multiple technical features. For instance, on some platforms, user comments can be presented in the form of “barrage comment”, which allows audiences' messages go across screens like bullets (Hu, Zhang, & Luo, 2016). Secondly, viewers' advice may affect a broadcaster's decision on video content. For instance, video game streaming broadcasters may take their followers' suggestions about what games they will play next, or which characters they should pick. Consequently, through all the participation behaviors, viewers may become more likely to see themselves as part of the group. Several related studies also suggest that the sense of participation or involvement may enhance relationships among users and promote group identification (e.g. Badrinarayanan et al., 2015; Luo et al., 2016). Therefore, we further infer that a viewer's sense of participation on live streaming platforms will increase his/her identification with an audience group.

H6. Participation is positively related to group identification.

Perceived similarity of group members has been regarded as a crucial antecedent of the attractiveness of group identity (Hsu et al., 2015; Stokburger-Sauer et al., 2012). The identity similarity mainly derives from common interests, shared knowledge, similar life backgrounds or personalities. Considering current study context, viewers exchanges opinions about streaming contents or express praises on broadcasters' performances. Then, a viewer may subconsciously engage in an assessment process to interpret whether and the extent to which he/she shares the homogeneous ideas and thoughts with others. A viewer who perceives high degree of cognitive communion via conversations with other audiences may experience a sense of like-mindedness between oneself and other group members. This inter-member communication among like-minded peers will enhance the sense of connectedness (Riley & White, 2016). In turn, the increased sense of belongingness to an audience group is crucial for group identification development (Tajfel & Turner, 1979; Trepte, 2006). Accordingly, we infer that cognitive communion perceived by a viewer will increase his/her identification with an audience group.

H7. Cognitive communion is positively related to group identification.

Resonant contagion happens when viewers' behaviors exert influences on each other in a reciprocal way. A typical example of resonant contagion is that, when a video game broadcaster has just won a brilliant match, some active audiences in the channel would comment in “marvelous”, “amazing”, or “congratulations” to express their compliments. Then, influenced by these comments, some silent viewers may engage in commenting the same messages. Consequently, the broadcaster's channel may result to be flooded with complimentary messages which often last for several minutes. On one hand, the resonant contagion reflects that group members tend to follow some group norms. The existence of group norm depicts shared ideology in terms of values, beliefs, and constitutions (Dholakia et al., 2004). The perception of resonant contagion confirms the correspondence between group norm and personal motivation, which makes members more easily to be influenced by others (Zhou & Li., 2014). Several studies further suggest this compatibility of core values between an individual and a group is likely to generate group identification (Dholakia et al., 2004; Tsai & Bagozzi, 2014). On the other hand, viewers with the experience of resonant contagion perceive that they can also influence others. Individual impact may engender a feeling of responsibilities for group activities as an influential member, thus boosting self-esteem. This is also in correspondence with the motivations of maintaining social identity to reach self-enhancement (Bhattacharya & Sen, 2003; Trepte, 2006). Therefore, we infer that the experience of resonant contagion perceived by a viewer will increase his/her identification with an audience group.

H8. Resonant contagion is positively related to group identification.

2.5. Influence of live streaming genres

Several recent studies have discovered that the content category of a video can influence user behaviors in terms of watching, liking, commenting, etc. (Khan & Vong, 2014; Lange, 2007). Different genres of videos show quite distinct viewing patterns (Zhu et al., 2015). Accordingly, we infer that the nature of streaming content itself may also influence users' behavior intention in terms of interaction style in current live video streaming context. In practice, most live streaming platforms often categorize different streaming channels according to their contents, e.g. video games, sports, and music. Specifically, we consider the two most popular streaming content genres which are and video games and talent shows.

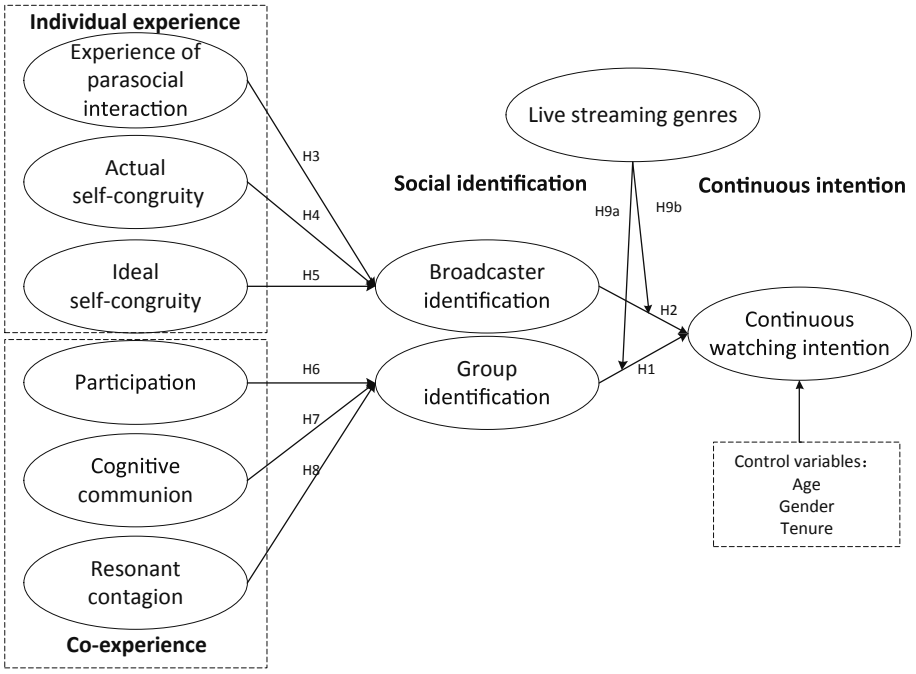

Fig. 1. Proposed research model.

Video games streaming activity, where a streamer broadcasts electronic sports, computer games, online games, etc., has received major attention in live video streaming studies (e.g. Hamilton et al., 2014; Smith et al., 2013). Within video game streaming channels, while enjoying watching real-time video games, viewers frequently engage in conversations related to the game contents with other audiences. In can be inferred that these viewers are often fans and supporters of certain video games that played by broadcasters. Compared to talent shows streaming, viewers in video game streaming channels generally share more common interests and knowledge regarding to these games per se. Also, inter-member communications are likely to be more active and frequent based on their similar identity background of game players. Thereby, emotional connections among audiences may be bonded more concretely, creating a stronger sense of group identification. The deep identification with other audiences may provide stronger incentive for staying, which boosts continuous intention.

We consider another streaming type as talent show streaming which involves a broadcaster's performance in various forms such as singing, dancing, and talk shows in real-time. Usually, streamers actively take part in chatting with their audiences while performing talent shows. The admiration of a viewer to a broadcaster can either derive from brilliant performances and skills, or come from adoration of the broadcaster' personal glamour. The connections formed between viewers and broadcasters resemble relations between celebrities and fans to a large extent. Studies suggest that attachment with celebrities may exert vital impact on their long-term relationship maintenance on social media (Click, Lee, & Holladay, 2013; Jin & Phua, 2014). Compared to experience of enjoying video game streaming contents, the tie between broadcasters and audiences may be more crucial in constituting viewers' whole experiences in the context of talent shows broadcast. Consequently, viewers may rely heavily on their attachment and identification of the broadcaster in their continuous watching decision. Therefore, we put forward the following hypotheses.

Table 1
Demographic information.

Variable	Category	Douyu TV (N = 218)		YY Live (N = 194)		Full samples (N = 412)	
		Numbers	Percentage	Numbers	Percentage	Numbers	Percentage
Gender	Male	127	58.26%	108	55.67%	235	57.04%
	Female	91	41.74%	87	44.85%	178	43.20%
Age	<18	30	13.76%	54	27.84%	84	20.39%
	18–25	120	55.05%	88	45.36%	208	50.49%
	25–35	61	27.98%	22	11.34%	83	20.15%
	>35	7	3.21%	30	15.46%	37	8.98%
Education level	Below high school	1	0.46%	4	2.06%	5	1.21%
	High school	19	8.72%	35	18.04%	54	13.11%
	Undergraduate or bachelor	184	84.40%	142	73.20%	326	79.13%
	Postgraduate or above	14	6.42%	13	6.70%	27	6.55%
Occupation	Student	141	64.68%	86	44.33%	227	55.10%
	Employee	69	31.65%	74	38.14%	143	34.71%
	Others	8	3.67%	34	17.53%	42	10.19%
Tenure	<3 months	45	20.64%	41	21.13%	86	20.87%
	3 months-6 months	53	24.31%	48	24.74%	101	24.51%
	6 months-1 year	59	27.06%	47	24.23%	106	25.73%
	>1 year	61	27.98%	58	29.90%	119	28.88%

Table 2
Reliability and convergent validity analysis for the full sample (N = 412).

Construct	Item	Factor loading	AVE	Composite Reliability	Cronbach's Alpha
Experience of parasocial interaction (EPSI)	EPSI1	0.84	0.69	0.87	0.78
	EPSI2	0.82			
	EPSI3	0.84			
Actual self-congruity (ASC)	ASC1	0.89	0.72	0.88	0.80
	ASC2	0.90			
	ASC3	0.75			
Ideal self-congruity (ISC)	ISC1	0.90	0.78	0.92	0.86
	ISC2	0.87			
	ISC3	0.87			
Participation (PAR)	PAR1	0.91	0.83	0.91	0.80
	PAR2	0.91			
Cognitive communion (COC)	COC1	0.83	0.69	0.87	0.77
	COC2	0.83			
	COC3	0.83			
Resonant contagion (REC)	REC1	0.85	0.68	0.87	0.77
	REC2	0.86			
	REC3	0.76			
Broadcaster identification (BRI)	BRI1	0.81	0.66	0.89	0.83
	BRI2	0.88			
	BRI3	0.86			
	BRI4	0.70			
Group identification (GRI)	GRI1	0.87	0.75	0.90	0.83
	GRI2	0.88			
	GRI3	0.84			
Continuous watching intention (CWI)	CWI1	0.92	0.78	0.91	0.86
	CWI2	0.89			
	CWI3	0.94			

H9a. The influence of group identification on continuous watching intention will be stronger in video games streaming than in talent shows streaming.

H9b. The influence of broadcaster identification on continuous watching intention will be stronger in talent shows streaming than in video games streaming.

Based on the social identity theory and the discussion above, we constructed our research model in Fig. 1.

3. Research methods

In order to examine our proposed research framework and hypotheses empirically, we conducted an online survey among live video streaming platform audiences in mainland China. A multi-item scales questionnaire based on prior literature was constructed. After the validation of reliability and validity of the scales, data analysis was carried out with the tool of SmartPLS 2.0.

3.1. Measures

We adopted measurement items from prior studies and adapted them to suit the context of our study to generate current questionnaire questions. Specifically, the experience of parasocial interaction came from the scale of Hartmann and Goldhoorn (2011). Actual self-congruity and ideal self-congruity items were adapted from Wang et al. (2015). Three dimensions of co-experience were measured by scales from Lim et al. (2012). As regard to broadcaster identification, the measurement items were adapted from Liu, Liao, and Wei (2015) and Shamir, Zakay, Breinin, and Popper (1998). Group identification items were adapted from those of Yoshida, Gordon, Heere, and James's (2015) measures of fan community identification. Continuous watching intention items were adapted from Kang, Hong, and Lee's (2009) study. All these measures followed the seven-point Likert response format (1 = "not agree at all" to 7 = "absolutely agree"). The scales of final investigation items are presented in Appendix A. In addition, we added gender, age, and tenure of membership as control variables in current study. Since the survey study was conducted in China, we followed the back-translation method suggested by Bhalla and Lin (1987). A marketing professor and two doctoral students who are proficient in both Chinese and English were involved in the back-translation process. Further, to ensure the content validity, we invited several graduate students, who are also devoted spectators on live streaming platforms, to check the wording, legibility and suitability of the questionnaire. Advices from them were taken into account in questionnaire refinement.

Table 3
Discriminant validity analysis for the full sample (N = 412).

	EPSI	ASC	ISC	PAR	COC	REC	BRI	GRI	CWI
EPSI	**0.83**								
ASC	0.48	**0.85**							
ISC	−0.06	−0.13	**0.88**						
PAR	0.45	0.37	−0.01	**0.91**					
COC	0.49	0.43	−0.04	0.38	**0.83**				
REC	0.38	0.30	−0.01	0.24	0.47	**0.82**			
BRI	0.61	0.50	0.07	0.39	0.62	0.47	**0.81**		
GRI	0.55	0.50	−0.06	0.46	0.52	0.45	0.58	**0.87**	
CWI	0.61	0.43	−0.04	0.41	0.45	0.35	0.54	0.54	**0.88**

Notes: Diagonal elements (in bold) are the square root of AVEs of constructs.

3.2. Data collection

Two different live video streaming websites, Douyu TV and YY Live, were chosen as representatives of video games dominated and talent show dominated platforms in current study. Founded in 2014, Douyu TV has become one of the most popular live video game streaming platforms in mainland China. It mainly focuses on video games and electronic sports, but it also covers education, entertainment and many other streaming contents. In 2016, Douyu TV announced it has over 12 million daily active users and 130 million monthly active users. Established in 2008, YY Live is one of the earliest live streaming platforms in China. Unlike Douyu TV, YY Live emphasizes the creativity of video-based user generated content, and mainly focuses on the content of individual talent performances including music, talk show, dancing and others. After several years of steady growth, it has attracted over 140 million monthly active users so far. Due to the popularity of these two platforms and their distinct positioning in live streaming market, we selected these platforms as appropriate contexts to implement our investigation.

Invitation messages were sent to potential respondents on these two platforms. Respondents were required to recall one of their subscribed live streaming channels they recently watched, and answer the questionnaire based on their actual experiences. One item was added as the screening question to know whether this channel was a video game channel on Douyu TV or a talent show channel on YY Live, otherwise the respondents won't be adopted as a valid sample. The sampling process was conducted during June to August 2016. In total, 428 questionnaires were retrieved, and 412 (Douyu TV, N = 218; YY Live, N = 194) valid samples were obtained. Table 1 demonstrates the demographic information of our respondents in detail. Among the valid samples, 57.04% were male and 43.20% were female. Most of the respondents were under 25 (70.64%), and have received higher education in universities or colleges (85.78%). Students accounted for 55.10% of the total samples. 28.88% of respondents reported that they have become a member of these platforms for over 1 year, and 20.87% were newcomers who registered less than 3 months ago.

Table 4
Reliability and convergent validity analysis for sub-samples: Douyu TV (N = 218) vs. YY Live (N = 194).

Construct	Item	Douyu TV (N = 218)				YY Live (N = 194)			
		Factor loading	AVE	C.R.	α	Factor loading	AVE	C.R.	α
Experience of parasocial interaction (EPSI)	EPSI1	0.82	0.68	0.86	0.76	0.87	0.72	0.88	0.80
	EPSI2	0.81				0.84			
	EPSI3	0.84				0.84			
Actual self-congruity (ASC)	ASC1	0.90	0.74	0.90	0.83	0.86	0.68	0.86	0.76
	ASC2	0.91				0.88			
	ASC3	0.77				0.73			
Ideal self-congruity (ISC)	ISC1	0.95	0.77	0.91	0.87	0.85	0.77	0.91	0.85
	ISC2	0.85				0.88			
	ISC3	0.84				0.91			
Participation (PAR)	PAR1	0.92	0.86	0.93	0.84	0.91	0.79	0.88	0.74
	PAR2	0.94				0.87			
Cognitive communion (COC)	COC1	0.81	0.68	0.87	0.77	0.83	0.69	0.87	0.78
	COC2	0.84				0.82			
	COC3	0.83				0.84			
Resonant contagion (REC)	REC1	0.83	0.68	0.86	0.76	0.89	0.69	0.87	0.78
	REC2	0.88				0.83			
	REC3	0.76				0.77			
Broadcaster identification (BRI)	BRI1	0.84	0.67	0.89	0.83	0.79	0.67	0.89	0.83
	BRI2	0.87				0.90			
	BRI3	0.87				0.84			
	BRI4	0.68				0.73			
Group identification (GRI)	GRI1	0.87	0.71	0.88	0.79	0.88	0.79	0.92	0.86
	GRI2	0.84				0.91			
	GRI3	0.81				0.87			
Continuous watching intention (CWI)	CWI1	0.92	0.77	0.91	0.85	0.93	0.80	0.92	0.87
	CWI2	0.89				0.89			
	CWI3	0.82				0.86			

4. Data analysis and results

We adopted the partial least squares (PLS) approach to evaluate the measurement and structural model. Specifically, we conducted data analysis with the software of SmartPLS 2.0 in this study.

4.1. Reliability and validity

We assessed the reliability and validity on the basis of three criteria: (1) composite reliability (C.R.) and Cronbach's Alpha (α) should be above 0.7 for reliability test; (2) all factor loadings should exceed 0.7 and average variance extracted (AVE) should exceed 0.5 for convergent validity test; (3) square root of each AVE should be greater than inter-construct correlations for discriminant validity test (Chin, 1998). We examined the reliability and validity of our measures for the full sample (N = 412), the Douyu TV sample (N = 218) and YY Live sample (N = 194) separately. Reliability and convergent validity results are shown in Table 2. Cronbach's Alpha of all constructs ranged from 0.77 to 0.86, and composite reliability was between 0.87 and 0.92, suggesting a satisfactory level of reliability. Also, all factor loadings were above 0.7, and AVEs were above 0.5, thus indicating favorable convergent validity. Finally, according to Table 3, square roots of AVEs (figures on diagonal of the matrix) were larger than the correlations between constructs in all cases, suggesting adequate discriminant validity.

We then moved on to the examination of measurement models for the sub-samples. Same procedures and assessment criteria were adopted. The contrastive results are demonstrated in Table 4 and Table 5. Similar results of reliability and validity were achieved compared to full samples. Only the factor loading of fourth item of broadcaster identification was 0.68 which didn't reach the ideal level of 0.7 in the case of Douyu TV. However, we decided to retain this item, since the factor loading of it exceeded 0.7 for the YY Live sub-sample and the full sample. Besides that, other results met all criteria in reliability and validity.

4.2. Structural model analysis

Fig. 2 shows the results of estimated structural model for the full sample, including path coefficients and the variance explained (R^2) by dependent variables. As shown in Fig. 2, the model explained 38% of the variance in audiences' intention to continue watching broadcasters' streaming channels. Also, 45% and 40% of variances were explained in broadcaster identification and group identification. Specifically, broadcaster identification and group identification were found to be positively associated with continuous watching intention (β = 0.34, t = 5.35; β = 0.33, t = 4.95), which supported H1 and H2. Broadcaster identification was significantly related to experience of parasocial interaction (β = 0.48, t = 11.08), actual self-congruity (β = 0.28, t = 5.96), and ideal self-congruity (β = 0.13, t = 2.70), thus supporting H3, H4, and H5. Correspondingly, group identification was found to be significantly associated with participation (β = 0.29, t = 5.89), cognitive communion (β = 0.30, t = 5.45), and resonant contagion (β = 0.24, t = 4.13), thereby supporting H6, H7, and H8.

To test the generalizability of our framework and conduct the group comparison study, we estimated the structural model with data from two sub-samples severally. Fig. 3 and Fig. 4 indicate the estimated results for Douyu TV sample and YY Live sample respectively. Similar to the result for full sample, all the path coefficients were found to be significant for both sub-samples. Overall, it can be summarized that H1–H8 have received sufficient support for the full sample and both sub-samples analyses.

4.3. Group comparison analysis

To test the effect of live streaming genres, we followed the

Table 5
Discriminant validity analysis for sub-samples: Douyu TV (N = 218) vs. YY Live (N = 194).

Construct	Douyu TV (N = 218)									YY Live (N = 194)								
	EPSI	ASC	ISC	PAR	COC	REC	BRI	GRI	CWI	EPSI	ASC	ISC	PAR	COC	REC	BRI	GRI	CWI
EPSI	**0.82**									**0.85**								
ASC	0.47	**0.86**								0.49	**0.82**							
ISC	−0.11	−0.22	**0.88**							0.03	−0.01	**0.88**						
PAR	0.48	0.32	−0.03	**0.93**						0.41	0.45	0.03	**0.89**					
COC	0.51	0.47	−0.05	0.41	**0.93**					0.46	0.38	0.00	0.35	**0.83**				
REC	0.39	0.34	0.02	0.31	0.53	**0.82**				0.37	0.25	−0.03	0.15	0.40	**0.83**			
BRI	0.62	0.49	0.04	0.38	0.65	0.49	**0.82**			0.61	0.51	0.12	0.41	0.58	0.46	**0.82**		
GRI	0.57	0.44	−0.03	0.45	0.50	0.51	0.53	**0.84**		0.53	0.59	−0.07	0.48	0.55	0.39	0.64	**0.89**	
CWI	0.65	0.43	−0.08	0.46	0.52	0.42	0.57	0.59	**0.87**	0.57	0.44	0.03	0.34	0.36	0.28	0.51	0.49	**0.89**

Notes: Diagonal elements (in bold) are the square root of AVEs of constructs.

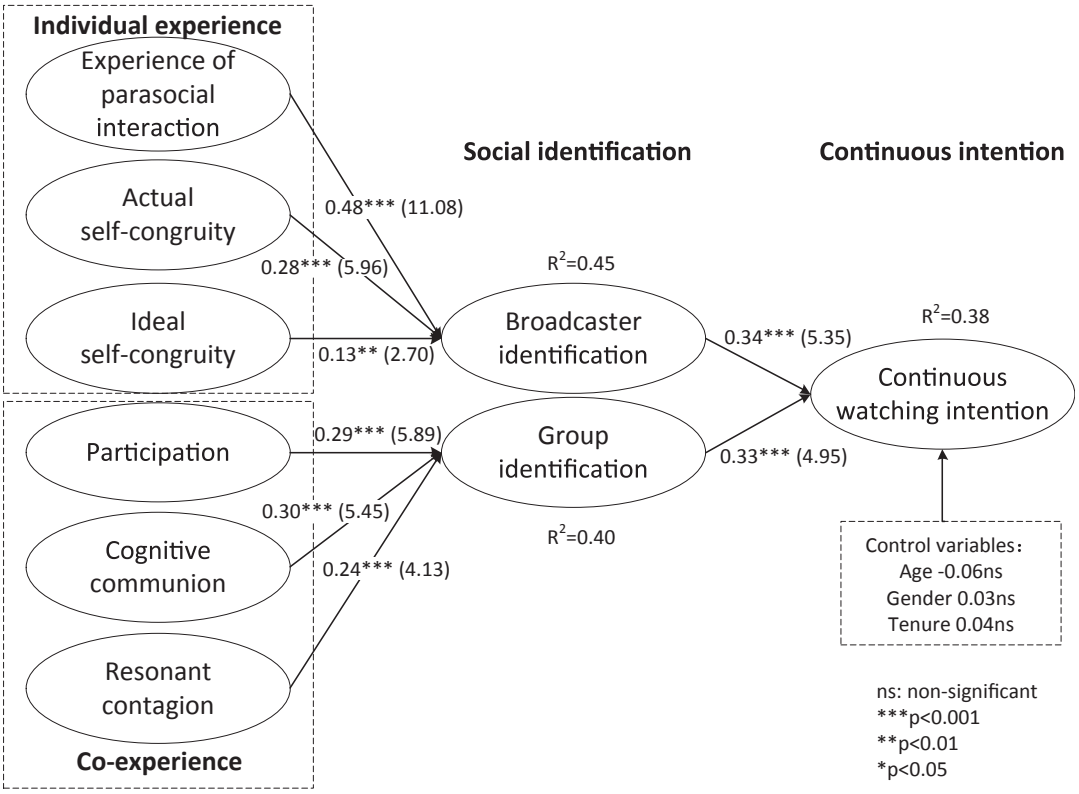

Fig. 2. Structural model analysis result for the full sample (N = 412).

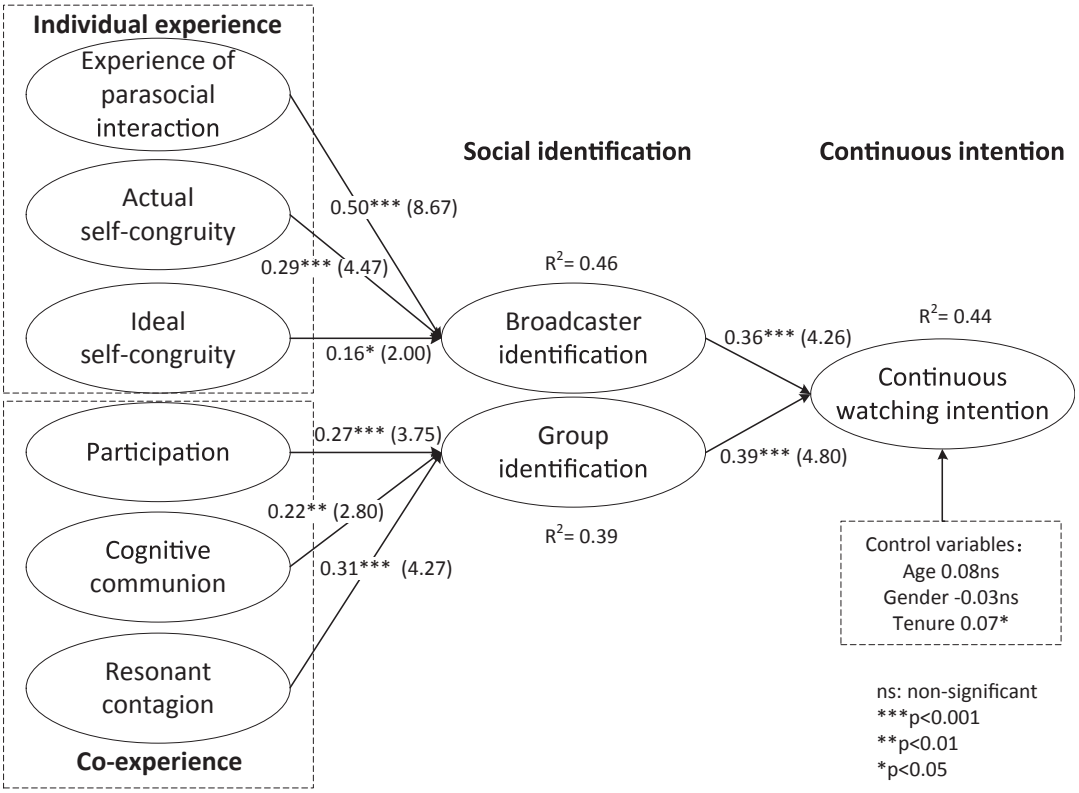

Fig. 3. Structural model analysis result for Douyu TV sample (N = 218).

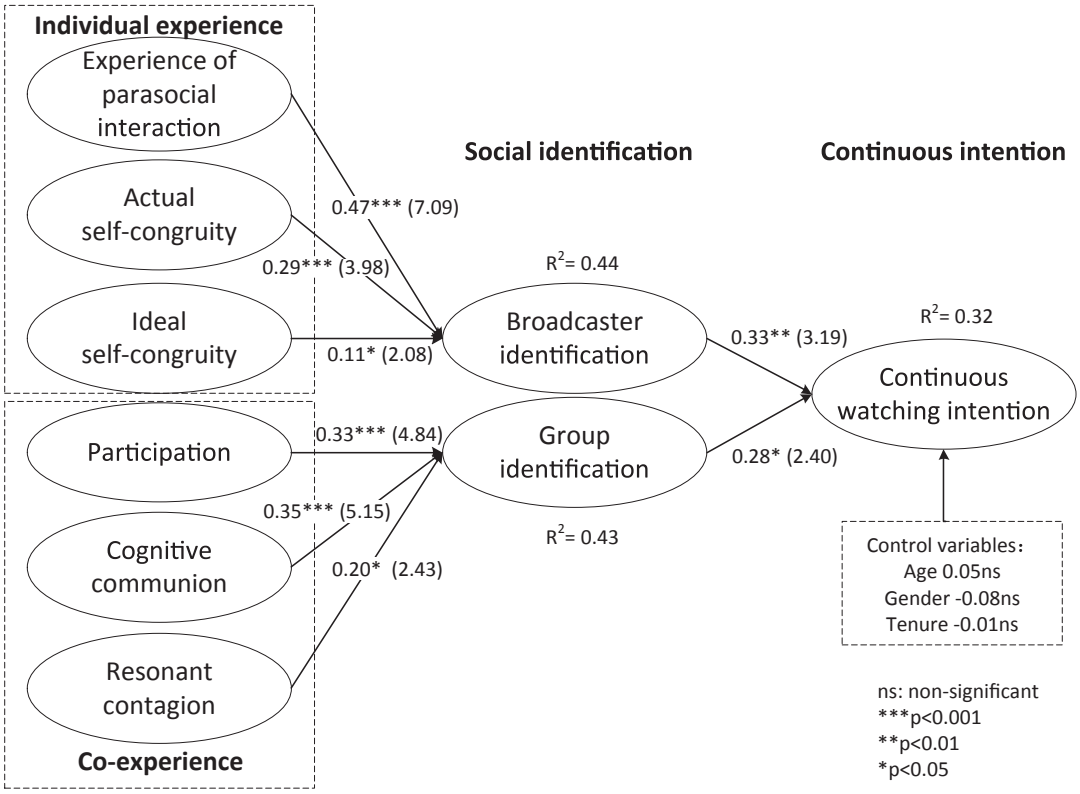

Fig. 4. Structural model analysis result for YY Live sample (N = 194).

process of subgroup comparison proposed by Keil et al. (2000). According to our data collection process, the Douyu TV sample represented video games streaming, whereas YY Live sample measured talent shows streaming. Table 6 shows the subgroup analysis result for Douyu and YY Live samples. $T_{spooled}$ value was used to evaluate the difference of each path. Accordingly, the path from group identification to continuous watching intention was significantly stronger among Douyu TV members, thus validating H9b. Contradictory to our expectation, the path from broadcaster identification to continuous watching intention was also greater for Douyu TV than YY Live respondents, rejecting H9a. In addition, we also calculated the differences for other paths. Paths from experience of parasocial interaction and ideal self-congruity to broadcaster identification were significantly higher among Douyu TV members. However, paths from participation and cognitive communion to group identification were significantly stronger among YY Live members. Finally, path from resonant contagion to group identification was found to be stronger for Douyu TV sample.

Table 6
Sub-group analysis between Douyu TV sample (N = 218) and YY Live sample (N = 194).

Path	Path coefficient		$t_{spooled}$
	Douyu TV	YY Live	
Experience of parasocial interaction → Broadcaster identification	0.50	0.46	6.45***
Actual self-congruity → Broadcaster identification	0.29	0.28	0.98ns
Ideal self-congruity → Broadcaster identification	0.16	0.11	6.66***
Participation → Group identification	0.27	0.33	−9.16***
Cognitive communion → Group identification	0.22	0.35	−17.86***
Resonant contagion → Group identification	0.31	0.20	14.95***
Broadcaster identification → Continuous watching intention	0.36	0.33	2.52*
Group identification → Continuous watching intention	0.39	0.28	11.37***

Notes: ns: non-significant, *p < 0.05, **p < 0.01, ***p < 0.001.

4.4. Result discussion

The empirical study validated most of proposed hypotheses in current study. First, two aspects of social identification of viewers, i.e. broadcaster identification and group identification, were found to be positively associated with continuous watching intention. Personal identification with broadcasters on live streaming platforms promotes users' continuous intention, which is a new phenomenon compared to other types of social media. This result also corresponds with prior study which indicates psychological bonds between individuals and groups are a crucial factor for loyalty behavior in virtual communities (Badrinarayanan et al., 2015).

Second, the antecedents of identifications were found by validating the relationships between viewers' experiences and their identifications. Broadcaster identification and audience group identification are formed by different interactive experiences. Specifically, we constructed individual experiences including experience of parasocial interaction, the perception of actual and ideal self-congruity as viewers' experiences based on encounters with broadcaster/streamer entities. Empirical results indicated that experiences of parasocial interaction, actual self-congruity, and ideal self-congruity were positively related to broadcaster identification. On the other side, the concept of co-experience was introduced to estimate viewers' experiences based on encounters with other audiences/viewers. Emerged form intragroup communications, co-experiences are co-created and shared among audiences as a necessary part of total user experiences. Conceptualized as participation, cognitive communion, and resonant contagion, co-

experiences were found to be positively associated with audience group identification.

Third, we also partially verified the moderating effect of streaming content genres on relations between social identifications and continuous watching intention. We conducted a group comparison analysis to compare the cases of video games streaming (Douyu TV) and talent shows streaming activities (YY Live). Empirical result implied that the influence of audience group identification on continuous intention was stronger for video games streaming. Audiences from the same video game streaming channel may also be fans of certain games. More frequent communications are more likely to be carried out, which promotes the development of group identification. Also, the desire to maintain connections between individuals and groups by continuous watching may be stronger for them.

Contradictory to our assumption, the influence of broadcast identification on continuous intention was slightly weaker for talent shows streaming than video games streaming. This issue may be explained by two reasons. First, the relative higher sense of group in video games may also facilitate a fandom culture within audience groups, favoring broadcasters they like. Many video games streaming viewers often regard their beloved broadcasters as idols. In like manner, several studies suggest fan community activities strengthen members' affections toward their idols or collective interests (Bennett, 2014; Pennington, Hall, & Hutchinson, 2016). Consequently, the influence of broadcaster identification was heightened in video games streaming. Second, as we argued earlier, broadcaster-viewer tie built via live streaming activities resemble celebrity-fan relationship. It can be inferred that identification theory possibly partially explained why viewers follow subscribed broadcasters' streaming. Viewers' streaming choice may stem from other factors, such as a broadcaster's fame, or his/her attractive appearance. In practice, YY Live has been positioning itself as “a babe fest” to attract audiences. Considering other potential factors that contribute to audiences' continuous intention, the impact of broadcaster identification may be moderated.

At last, we also explored some differences in the formation of identifications between two sub-samples. Experiences of parasocial interaction and ideal self-congruity exert stronger influences on broadcaster identification for video games steaming. And two dimensions of co-experiences (participation and cognitive communion) exert stronger impacts on group identification. These results may roots in the different broadcasting style between two subsamples. In video game streaming, audiences may pay more attention to the game content per se. If the broadcaster can take interactive style to communicate with his/her audiences, creating rich individual experiences, the personal identification will be significantly elevated. Comparatively, in talent shows streaming, interactions mainly happens between audiences and performers. When broadcasters take measures in encouraging communications among his/her viewers, the degree of group identification development is likely to be stronger. In summary, the formation differences of identifications remain as a valuable issue worthy of exploration in future study.

5. Implication

5.1. Theoretical implication

The current study contributes to extent literature on live video streaming research in following aspects. First, live streaming activity, as a newly emerged phenomenon, hasn't received adequate attention in academic domain. To the best of our knowledge, current study is among the first to investigate watching behavior on live streaming platforms from a social-psychological and empirical perspective. Specifically, based on social identity theory, we constructed a dual identification framework to explain the influence of social identifications on viewers' continuous intention on live streaming platforms. This is inconsistence with previous study which indicates social identities can serve as forceful behavioral guidance, and provide “what to do” information individuals (Kleine, Klein, & Kernan, 1993).

Second, our study contributes to social identity theory in following aspects. Most studies focusing on social media have analyzed single identification concepts, although recent studies have acknowledged the diversity of identification (He, Li, & Harris, 2012; Hsu et al., 2015). Also, several studies have taken identification for granted and failed to investigate the formation of it (Tuškej et al., 2013). To further refine extant research on identification concept, we analyzed the generation of viewers' multiple broadcaster and audience group identifications from a user experience perspective. Specifically, broadcaster identification was found to be positively related to experience of parasocial interaction and self-congruity with broadcasters, whereas audience group identification resulted from co-experiences, including participation, cognitive communion, and resonant contagion, which were co-created by audience group members.

Third, we conducted a platform comparison analysis in empirical study. On one hand, by doing so, we validated the generalizability of proposed research model. For either sub-sample, most of proposed hypotheses have received support in data analysis. On the other hand, the group comparison analysis allowed us to examine the influence of streaming content genres on continuous watching intention. Empirical results revealed that, compared with talent shows streaming, audience group identification could exert stronger impact on continuous watching intention in video games streaming. This finding suggests that genres of streaming contents may subtly affect members' interaction style, which means they may either focus on communication within broadcaster-audience tie, or spend more time on inter-audience interaction in certain streaming category. Thereby, current study may inspire researchers with consideration of video streaming genres to obtain more systematic findings.

5.2. Practical implication

This research informs practitioners will several important implications. First, the success of video streaming platforms is the appropriate integration of resources from various entities including audiences, broadcasters, and platforms. Facing the fierce competition among plenty of live streaming platforms, marketers and managers should understand how to exploit valid targets for identification in a suitable way to foster user stickiness and facilitate long-term relationship sustainment. Specifically, the level of identifications of broadcasters and audience groups are crucial antecedents for viewers' decision on whether to stay or leave. Our study provides a new approach for practitioners. The proposed dual identification model implies that streaming platform operators can enhance the connections within audience-broadcaster tie and audience-other audiences tie to boost audiences' willingness to stay and continuously engage.

Second, platform managers and operators should carefully consider how to cultivate viewers' identifications in broadcaster and audience group bases. Several measures can be employed in platform design and operation stages to increase opportunities for multi-entities communication and interaction. On one hand, identification with broadcasters can be strengthened by providing rich experiences of parasocial interaction and self-congruity. The experience of parasocial interaction can be augmented via providing features favoring communications between broadcasters

and audiences. For instance, existing platform function has allowed gift sending and commenting from audiences toward broadcasters. In a similar vein, a reciprocal mechanism may be built to heighten parasocial interaction by providing features that enable broadcasters to express their gratitude in terms of special badges, digital gift, or thanksgiving messages. Meanwhile, incentive policies including tangible and intangible rewards may be effective to promote broadcasters self-disclosure. By doing so, it is easier for viewers to comprehend broadcasters' self-images and make comparisons. On the other hand, identification with audience groups can engender through the co-experiences shared and co-created by group members. Specifically, sense of participation can be achieved by offering audiences more opportunities to take part in group activities, and introduce popular themes and latest topics for viewers to share their opinions with each other. Building different interest groups may enable audiences to find like-minded others, which enhance their cognitive communion. Also, the sense of resonant contagion can be augmented when platforms hold more activities organized by audiences. Various roles and duties distributed to audiences can enhance member empowerment which expands influence between members.

In addition, current study also suggests that platform operation patterns should be differentiated according to different live streaming genres. Currently, most live streaming platforms only categorize streaming channels according to their contents, such as video games, music, sports etc. However, few customized corresponding operation and marketing tactics can be found. Procedures can be implemented with the help of personal investigations to understand motivations and preferences among viewers who participate in different streaming channels. Customized activities can be conducted according to divers streaming categories. For instance, voting or competition for viewers' idols can be held among talent shows streaming channels, while gathering parties may be more suitable for fans following the same video games streaming channels.

6. Limitation and future research

Several limitations exist in this study. First, it is acknowledged that the research context selection and data collection process might restrict the generalizability of the results. We conducted the investigation in mainland China and collect data from two live streaming platforms. Future studies are suggested to extend current research scope to including other platforms. Meanwhile, cross-national analysis is encouraged to offer a more inclusive understanding of live streaming phenomenon. Second, we compared two genres of live streaming, i.e. video games streaming and talent shows streaming. In fact, there are other popular categories available for audiences, such as sports and education. User behavior patterns within these streaming types may vary as well. Thereby, future studies should incorporate other streaming categories and conduct more detailed comparison research to understand the influence of streaming contents. Third, our empirical study indicates that differences caused by streaming genres also exist in the formation process of social identifications. Current study hasn't elaborated detailed analysis and explanation on these issues. Future studies can make further efforts in exploring this mechanism via various empirical methods including field investigation and group interview. Finally, regarding the proposed framework and selected constructs, future studies might explore additional antecedents, moderators, and control variables to develop a more holistic understanding of live video streaming consumption. For instance, users' psychological factors such as their need for uniqueness or need to belong may potentially impact their preference in identification. Also, factors from broadcaster aspects, such as their communication skills and personal charm, should be included to further augment the proposed framework.

Acknowledgement

The authors gratefully acknowledge the support of National Natural Science Foundation of China (No. 71272018), and the useful suggestions by the editor and reviewers.

Appendix A. Constructs and measurement items

Measurement items	Sources
Experience of parasocial interaction (EPSI)	Hartmann and Goldhoorn (2011)
EPSI1. While I was watching, the broadcaster knew I paid attention to him/her.	
EPSI2. While I was watching, the broadcaster knew that I reacted to him/her.	
EPSI3. While I was watching, the broadcaster reacted to what I said or did.	
Actual self-congruity (ASC)	Wang et al. (2015)
ASC1. Concerning our characters, this broadcaster and I are very similar.	
ASC2. I resemble the typical audience of this channel very much.	
ASC3. I can easily identify with this broadcaster.	
Ideal self-congruity (ISC)	Wang et al. (2015)
ISC1. The ideal of me is very similar to the character of this broadcaster.	
ISC2. Participating in this channel, I want to show the best of me.	
ISC3. This broadcaster reflects my ideal self.	
Participation (PAR)	Lim et al. (2012)
PAR1. I felt I was a part of the audience group.	
PAR2. I felt I was participating with our audience group members.	
Cognitive communion (COC)	Lim et al. (2012)
COC1. I felt I shared similar thoughts with other audiences.	
COC2. I felt my knowledge was shared with other audiences.	
COC3. I felt I shared the same perspective as other audiences.	
Resonant contagion (REC)	Lim et al. (2012)
REC1. My behavior was influenced by other audiences of the group.	
REC2. My behavior influenced other audiences of the group.	
REC3. Our audience group agreed upon similar opinions.	
Broadcaster identification (BRI)	Liu et al. (2015) Shamir et al. (1998)
BRI1. I am proud to be the broadcaster's follower.	
BRI2. The broadcaster represents values that are important to me.	
BRI3. My values are similar to the broadcaster's values.	

(*continued*)

Measurement items	Sources
BRI4. The broadcaster is a model for me to follow	
Group identification (GRI)	Yoshida, Gordon, Heere, & James (2015)
GRI1. I really identify with people who follow the broadcaster.	
GRI2. I feel like I belong to a club with other fans of the broadcaster.	
GRI3. The broadcaster is supported by people like me.	
Continuous watching intention (CWI)	Kang, Hong, and Lee (2009)
CWI1. I intend to continue following the broadcaster rather than discontinuance.	
CWI2. I intend to continue watching the broadcaster's show rather than other alternatives.	
CWI3. I would like to discontinue subscribe the broadcaster's channel (reverse coded).	

References

Aguirre-Rodriguez, A., Bóveda-Lambie, A. M., & Miniard, P. W. (2015). The impact of consumer avatars in Internet retailing on self-congruity with brands. *Marketing Letters, 26*(4), 631–641.

Algesheimer, R., Dholakia, U. M., & Herrmann, A. (2005). The social influence of brand community: Evidence from European car clubs. *Journal of Marketing, 69*(3), 19–34.

Ashforth, B. E., Harrison, S. H., & Corley, K. G. (2008). Identification in organizations: An examination of four fundamental questions. *Journal of Management, 34*(3), 325–374.

Ashforth, B. E., & Mael, F. (1989). Social identity theory and the organization. *Academy of Management Review, 14*(1), 20–39.

Badrinarayanan, V. A., Sierra, J. J., & Martin, K. M. (2015). A dual identification framework of online multiplayer video games: The case of massively multiplayer online role playing games (MMORPGs). *Journal of Business Research, 68*(5), 1045–1052.

Barekatain, B., Khezrimotlagh, D., Maarof, M. A., Ghaeini, H. R., Quintana, A. A., & Cabrera, A. T. (2015). Efficient P2P live video streaming over hybrid WMNs using random network coding. *Wireless Personal Communications, 80*(4), 1761–1789.

Basil, M. D. (1996). Identification as a mediator of celebrity effects. *Journal of Broadcasting & Electronic Media, 40*(4), 478–495.

Battarbee, K. (2003a). Defining co-experience. In *Proceedings of the 2003 international conference on Designing pleasurable products and interfaces* (pp. 109–113) (Pittsburgh, PA, USA).

Battarbee, K. (2003b). Co-experience: The social user experience. In *CHI'03 extended abstracts on Human factors in computing systems* (pp. 730–731). Florida, USA: Ft. Lauderdale.

Belén del Río, A., Vazquez, R., & Iglesias, V. (2001). The effects of brand associations on consumer response. *Journal of Consumer Marketing, 18*(5), 410–425.

Bennett, L. (2014). Fan/celebrity interactions and social media: Connectivity and engagement in lady gaga fandom. In L. Duits, K. Zwann, & S. Reijnders (Eds.), *The ashgate research companion to fan cultures* (pp. 109–120). Ashgate Publishing.

Bhalla, G., & Lin, L. Y. (1987). Cross-cultural marketing research: A discussion of equivalence issues and measurement strategies. *Psychology and Marketing, 4*(4), 275–285.

Bhattacharya, C. B., & Sen, S. (2003). Consumer-company identification: A framework for understanding consumers' relationships with companies. *Journal of Marketing, 67*(2), 76–88.

Boon, S. D., & Lomore, C. D. (2001). Admirer-celebrity relationships among young adults. *Human Communication Research, 27*(3), 432–465.

Brewer, M. B. (1991). The social self: On being the same and different at the same time. *Personality and Social Psychology Bulletin, 17*(5), 475–482.

Brown, W. J. (2015). Examining four processes of audience involvement with media personae: Transportation, parasocial interaction, identification, and worship. *Communication Theory, 25*(3), 259–283.

Brown, W. J., & Basil, M. D. (2010). Parasocial interaction and identification: Social change processes for effective health interventions. *Health Communication, 25*(6–7), 601–602.

Brown, W. J., & de Matviuk, M. A. C. (2010). Sports celebrities and public health: Diego Maradona's influence on drug use prevention. *Journal of Health Communication, 15*(4), 358–373.

Chin, W. W. (1998). The partial least squares approach to structural equation modeling. *Modern Methods for Business Research, 295*(2), 295–336.

Click, M. A., Lee, H., & Holladay, H. W. (2013). Making monsters: Lady Gaga, fan identification, and social media. *Popular Music and Society, 36*(3), 360–379.

Cohen, E. L., & Tyler, W. J. (2016). Examining perceived distance and personal authenticity as mediators of the effects of ghost-tweeting on parasocial interaction. *Cyberpsychology, Behavior, and Social Networking, 19*(5), 342–346.

Dholakia, U. M., Bagozzi, R. P., & Pearo, L. K. (2004). A social influence model of consumer participation in network-and small-group-based virtual communities. *International Journal of Research in Marketing, 21*(3), 241–263.

Dibble, J. L., Hartmann, T., & Rosaen, S. F. (2016). Parasocial interaction and parasocial relationship: Conceptual clarification and a critical assessment of measures. *Human Communication Research, 42*(1), 21–44.

Frederick, E. L., Lim, C. H., Clavio, G., & Walsh, P. (2012). Why we follow: An examination of parasocial interaction and fan motivations for following athlete archetypes on Twitter. *International Journal of Sport Communication, 5*(4), 481–502.

Füller, J., Matzler, K., & Hoppe, M. (2008). Brand community members as a source of innovation. *Journal of Product Innovation Management, 25*(6), 608–619.

Hall-Phillips, A., Park, J., Chung, T. L., Anaza, N. A., & Rathod, S. R. (2016). I (heart) social ventures: Identification and social media engagement. *Journal of Business Research, 69*(2), 484–491.

Hamilton, W. A., Garretson, O., & Kerne, A. (2014). Streaming on twitch: Fostering participatory communities of play within live mixed media. In *Proceedings of the SIGCHI conference on human factors in computing systems* (pp. 1315–1324). Toronto, Ontario: Canada, ACM.

Hargittai, E., & Litt, E. (2011). The tweet smell of celebrity success: Explaining variation in Twitter adoption among a diverse group of young adults. *New Media & Society, 13*(5), 824–842.

Hartmann, T., & Goldhoorn, C. (2011). Horton and Wohl revisited: Exploring viewers' experience of parasocial interaction. *Journal of Communication, 61*(6), 1104–1121.

He, H., Li, Y., & Harris, L. (2012). Social identity perspective on brand loyalty. *Journal of Business Research, 65*(5), 648–657.

Helm, S. V., Renk, U., & Mishra, A. (2016). Exploring the impact of employees' self-concept, brand identification and brand pride on brand citizenship behaviors. *European Journal of Marketing, 50*(1/2), 58–77.

Horton, D., & Richard Wohl, R. (1956). Mass communication and para-social interaction: Observations on intimacy at a distance. *Psychiatry, 19*(3), 215–229.

Houlberg, R. (1984). Local television news audience and the para-social interaction. *Journal of Broadcasting & Electronic Media, 28*(4), 423–429.

Hsu, L. C., Chih, W. H., & Liou, D. K. (2015). Understanding community citizenship behavior in social networking sites. *Industrial Management & Data Systems, 115*(9), 1752–1772.

Hu, M., Zhang, M., & Luo, N. (2016). Understanding participation on video sharing communities: The role of self-construal and community interactivity. *Computers in Human Behavior, 62*, 105–115.

Jin, S. A. A., & Phua, J. (2014). Following celebrities' tweets about brands: The impact of Twitter-based electronic word-of-mouth on consumers' source credibility perception, buying intention, and social identification with celebrities. *Journal of Advertising, 43*(2), 181–195.

Kang, Y. S., Hong, S., & Lee, H. (2009). Exploring Continued Online Service Usage Behavior: The Roles of Self-Image Congruity and Regret. *Computers in Human Behavior, 25*(1), 111–122.

Kaplan, A. M., & Haenlein, M. (2010). Users of the world, unite! the challenges and opportunities of Social Media. *Business Horizons, 53*(1), 59–68.

Katz, E., & Liebes, T. (1990). Interacting with" Dallas": Cross cultural readings of american TV. *Canadian Journal of Communication, 15*(1), 45–66.

Kaytoue, M., Silva, A., Cerf, L., Meira, W., Jr., & Raïssi, C. (2012). Watch me playing, i am a professional: A first study on video game live streaming. In *Proceedings of the 21st international conference on world wide web* (pp. 1181–1188). Lyon, France: ACM.

Keh, H. T., & Xie, Y. (2009). Corporate reputation and customer behavioral intentions: The roles of trust, identification and commitment. *Industrial Marketing Management, 38*(7), 732–742.

Keil, M., Tan, B. C., Wei, K. K., Saarinen, T., Tuunainen, V., & Wassenaar, A. (2000). A cross-cultural study on escalation of commitment behavior in software projects. *MIS Quarterly, 24*(2), 299–325.

Kelman, H. C. (1961). Processes of opinion change. *Public Opinion Quarterly, 25*(1), 57–78.

Khan, G. F., & Vong, S. (2014). Virality over YouTube: An empirical analysis. *Internet Research, 24*(5), 629–647.

Kleine, R. E., Kleine, S. S., & Kernan, J. B. (1993). Mundane consumption and the self: A social-identity perspective. *Journal of Consumer Psychology, 2*(3), 209–235.

Koo, W., Cho, E., & Kim, Y. K. (2014). Actual and ideal self-congruity affecting consumers' emotional and behavioral responses toward an online store. *Computers in Human Behavior, 36*, 147–153.

Kressmann, F., Sirgy, M. J., Herrmann, A., Huber, F., Huber, S., & Lee, D. J. (2006). Direct and indirect effects of self-image congruence on brand loyalty. *Journal of Business Research, 59*(9), 955–964.

Labrecque, L. I. (2014). Fostering consumer–brand relationships in social media environments: The role of parasocial interaction. *Journal of Interactive Marketing, 28*(2), 134–148.

Lange, P. G. (2007). Publicly private and privately public: Social networking on YouTube. *Journal of Computer-mediated Communication, 13*(1), 361–380.
Lee, E. J., & Oh, S. Y. (2012). To personalize or depersonalize? When and how politicians' personalized tweets affect the public's reactions. *Journal of Communication, 62*(6), 932–949.
Lim, S., Cha, S. Y., Park, C., Lee, I., & Kim, J. (2012). Getting closer and experiencing together: Antecedents and consequences of psychological distance in social media-enhanced real-time streaming video. *Computers in Human Behavior, 28*(4), 1365–1378.
Lin, H., Fan, W., & Chau, P. Y. (2014). Determinants of users' continuance of social networking sites: A self-regulation perspective. *Information & Management, 51*(5), 595–603.
Liu, S. M., Liao, J. Q., & Wei, H. (2015). Authentic leadership and whistleblowing: Mediating roles of psychological safety and personal identification. *Journal of Business Ethics, 131*(1), 107–119.
Luo, N., Zhang, M., Hu, M., & Wang, Y. (2016). How community interactions contribute to harmonious community relationships and customers' identification in online brand community. *International Journal of Information Management, 36*(5), 673–685.
Nambisan, S., & Baron, R. A. (2009). Virtual customer environments: Testing a model of voluntary participation in value co-creation activities. *Journal of Product Innovation Management, 26*(4), 388–406.
Needleman, S. (2015). *Twitch's viewers reach 100 million a month*. Available at: http://blogs.wsj.com/digits/2015/01/29/twitchs-viewers-reach-100-million-a-month (Accessed 12 November 2016).
Pennington, N., Hall, J. A., & Hutchinson, A. (2016). To tweet or not to Tweet: Explaining fan-celebrity interaction on twitter. *Iowa Journal of Communication, 48*(1/2), 55–75.
Pires, K., & Simon, G. (2015). YouTube live and twitch: A tour of user-generated live streaming systems. In *Proceedings of the 6th ACM multimedia systems conference* (pp. 225–230). Portland, Oregon, USA: ACM.
Postmes, T., Spears, R., Lee, A. T., & Novak, R. J. (2005). Individuality and social influence in groups: Inductive and deductive routes to group identity. *Journal of Personality and Social Psychology, 89*(5), 747–763.
Powell, L., Richmond, V. P., & Williams, G. C. (2011). Social networking and political Campaigns: Perceptions of candidates as interpersonal constructs. *North American Journal of Psychology, 13*(2), 331–342.
Riley, T., & White, V. (2016). Developing a sense of belonging through engagement with like-minded peers: A matter of equity. *New Zealand Journal of Educational Studies, 51*(2), 211–225.
Roy, R., & Rabbanee, F. K. (2015). Antecedents and consequences of self-congruity. *European Journal of Marketing, 49*(3/4), 444–466.
Shamir, B., Zakay, E., Breinin, E., & Popper, M. (1998). Correlates of charismatic leader behavior in military units: Subordinates' attitudes, unit characteristics, and superiors' appraisals of leader performance. *Academy of Management Journal, 41*(4), 387–409.
Shen, K. N., & Khalifa, M. (2015). *Explaining virtual community participation: Accounting for the IT artifacts through identification and identity confirmation*. In From Information to Smart Society. Springer International Publishing.
Sirgy, M. J. (1982). Self-concept in consumer behavior: A critical review. *Journal of Consumer Research, 9*(3), 287–300.
Smith, T., Obrist, M., & Wright, P. (2013). Live-streaming changes the (video) game. In *Proceedings of the 11th european conference on interactive TV and video* (pp. 131–138). Como, Italy: ACM.
Stern, B. B., Russell, C. A., & Russell, D. W. (2007). Hidden persuasions in soap operas: Damaged heroines and negative consumer effects. *International Journal of Advertising, 26*(1), 9–36.
Stokburger-Sauer, N., Ratneshwar, S., & Sen, S. (2012). Drivers of consumer–brand identification. *International Journal of Research in Marketing, 29*(4), 406–418.
Tajfel, H., & Turner, J. (1979). An integrative theory of intergroup conflict. In W. Austin, & S. Worchel (Eds.), *The social psychology of intergroup relations*. Monterey, CA: Brooks/Cole.
Tang, J. C., Venolia, G., & Inkpen, K. M. (2016). Meerkat and periscope: I stream, you stream, apps stream for live streams. In *Proceedings of the 2016 CHI conference on human factors in computing systems* (Vol. 16, pp. 4770–4780). Santa Clara, California, USA: CHI.
Thomson, M. (2006). Human brands: Investigating antecedents to consumers' strong attachments to celebrities. *Journal of Marketing, 70*(3), 104–119.
Trepte, S. (2006). Social identity theory. In J. Bryant, & P. Vorderer (Eds.), *Psychology of entertainment* (pp. 255–271). Mahwah, NJ: Erlbaum.
Tsai, H. T., & Bagozzi, R. P. (2014). Contribution behavior in virtual Communities: Cogntiive, emotional, and social influences. *MIS Quarterly, 38*(1), 143–163.
Tuškej, U., Golob, U., & Podnar, K. (2013). The role of consumer–brand identification in building brand relationships. *Journal of Business Research, 66*(1), 53–59.
Wang, Y., Chan, S. F., & Yang, Z. (2013). Customers' perceived benefits of interacting in a virtual brand community in China. *Journal of Electronic Commerce Research, 14*(1), 49–66.
Wang, S. J., Hsu, C. P., Huang, H. C., & Chen, C. L. (2015). How readers' perceived self-congruity and functional congruity affect bloggers' informational influence: Perceived interactivity as a moderator. *Online Information Review, 39*(4), 537–555.
Xiang, L., Zheng, X., Lee, M. K., & Zhao, D. (2016). Exploring consumers' impulse buying behavior on social commerce platform: The role of parasocial interaction. *International Journal of Information Management, 36*(3), 333–347.
Yoshida, M., Heere, B., & Gordon, B. (2015). Predicting behavioral loyalty through community: Why other fans are more important than our own intentions, our satisfaction, and the team itself. *Journal of Sport Management, 29*(3), 318–333.
Zhang, F. W., Liao, J. Q., & Yuan, J. M. (2016). Ethical leadership and whistleblowing: Collective moral potency and personal identification as mediators. *Social Behavior and Personality: An International Journal, 44*(7), 1223–1231.
Zheng, Y., Zhao, K., & Stylianou, A. (2013). The impacts of information quality and system quality on users' continuance intention in information-exchange virtual communities: An empirical investigation. *Decision Support Systems, 56*, 513–524.
Zhou, T., & Li, H. (2014). Understanding mobile SNS continuance usage in China from the perspectives of social influence and privacy concern. *Computers in Human Behavior, 37*, 283–289.
Zhu, W., He, H., Treviño, L. K., Chao, M. M., & Wang, W. (2015). Ethical leadership and follower voice and performance: The role of follower identifications and entity morality beliefs. *The Leadership Quarterly, 26*(5), 702–718.
Zhu, Y., Heynderickx, I., & Redi, J. A. (2015). Understanding the role of social context and user factors in video Quality of Experience. *Computers in Human Behavior, 49*, 412–426.

Mu Hu is a PhD Candidate at the School of Economics and Management in Beihang University, Beijing, China. His research interest comprises social commerce and entrepreneurial management. His work has been published in *Computers in Human Behavior, International Journal of Information Management,* and other journals.

Mingli Zhang is a professor at the School of Economics and Management in Beihang University, Beijing, China. His main research interest has been in the area of customer behavior in e-marketing, branding strategies, and customer value. His work has been published in *Internet Research, Computers in Human Behavior, International Journal of Information Management, Journal of Business-to-Business Marketing, Psychology & Marketing,* and other journals.

Yu Wang is a PhD candidate at the School of Economics and Management, Beihang University, Beijing, China. Her research centers on information technology, social science and digital marketing. Her work has been published in *Computers in International Journal of Information Management.*