

Understanding the Negative Consequences of Watching Social Live Streaming Among Chinese Viewers

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As an emerging media technology, social live streaming has been gaining prevalence worldwide, especially in some East Asian countries such as China. Meanwhile, this media format has received increasing criticism for its negative impact on individual viewers. The present study conducted an online survey among current viewers of social live streaming ($N = 244$) in China to test a conceptual model that explains how watching live streams leads to undesirable consequences. The findings indicate that viewers' enjoyment with broadcasters was positively associated with their parasocial relationship with the broadcasters, which in turn led to increased loneliness and addiction among the viewers. Viewers' perceptions of loneliness were also a direct factor that influenced their addictive media usage. In addition, viewers' entertainment-seeking motive and social interaction motive were identified as the antecedents to their enjoyment with broadcasters. These findings are believed to provide both theoretical and practical implications for the field of emerging digital media.

Keywords: social live streaming, entertainment seeking, social interaction, enjoyment, parasocial relationship, loneliness, addiction, negative consequences of digital media

Social live streaming service (SLSS), with its featured on-demand content, enables users to broadcast themselves and also watch others' streams in real time. With all of the user activities (e.g., broadcasting, commenting, gift-giving, etc.) occurring simultaneously, social live streaming is characterized by synchronicity, which differentiates this innovative media format from other social media platforms (Scheibe, Fietkiewicz, & Stock, 2016). As a typical example of media convergence, social live streaming is currently very popular among young adults in some East Asian countries, especially in China where it has attracted millions of active users and generated more than \$3 billion in revenue in 2016 (Kelly & Wang, 2017). This communication technology has been widely employed to deliver a variety of broadcasting content, such as food, gaming, celebrity, and music. Some university professors also have adopted it for education purposes (Li, 2017).

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Scholars of media effects have mainly investigated social live streaming from the perspective of broadcasters (e.g., Bründl & Hess, 2016; Friedländer, 2017; Tang, Venolia, & Inkpen, 2016), leaving the viewers' perspective underexplored (Bründl, Matt, & Hess, 2017). The current practice of social live streaming in China has received a lot of criticism because of its negative consequences (Li, 2016; Liu, 2017). For example, a large number of teenagers and young adults have become addicted to this media service and such an addiction has caused many social and even legal problems (Li, 2016; Zimmer, Fietkiewicz, & Stock, 2017). Therefore, it is necessary for practitioners and researchers to figure out what leads to the negative consequences of social live streaming from the perspective of viewers. Given that a major voice from the critics claims that addictive viewing of social live streaming goes hand in hand with social isolation (Roberts, 2017), we analyzed addiction and loneliness as the consequences of viewing social live streaming in this study following existing research on media users' psychological well-being (Kim, LaRose, & Peng, 2009).

A defining feature of viewers' experience of watching social live streaming is the real-time, face-to-face interaction with broadcasters (M. Hu, Zhang, & Wang, 2017). According to the current criticism of this media form, broadcasters are believed to be largely responsible for the negative influences on viewers (Bai & He, 2017). Accordingly, we explored the determinants of the undesirable impact of social live streaming by mainly focusing on viewers' interactions with broadcasters. Based on previous research, one's interaction with a broadcaster could be conceptually decomposed into enjoyment and a parasocial relationship with the broadcaster, as social live streaming is primarily a hedonic media platform (Bründl et al., 2017) and viewers often develop the illusion of intimacy with broadcasters (M. Hu et al., 2017). In addition, the antecedents to viewers' interactions with broadcasters were also examined to provide a more holistic picture of the entire process that leads to the negative consequences. Based on the uses and gratifications (U&G) approach (Katz, Blumler, & Gurevitch, 1974), we attempted to identify the motives of using social live streaming as the driving force of viewers' interactions with broadcasters.

In summary, the purpose of this study was to understand the negative consequences of watching social live streaming in a social-psychological approach. Specifically, study tested a conceptual model that could explain the psychological procedure of how this innovative media format exerts negative effects on its viewers. Theoretically, this study will contribute to the literature of human-computer interaction by empirically examining the "dark side" of an emerging communication technology from the perspective of common users, which is currently underinvestigated. Practically, this study will respond to the current criticism on social live streaming in China and provide useful suggestions for conducting regulations to protect media users, especially adolescents and younger adults.

Literature Review

Enjoyment With Broadcasters and Its Antecedents

One of the key characteristics that differentiates social live streaming from other types of social media is the central role of broadcasters in the process of media consumption (M. Hu et al., 2017; Smith, Obrist, & Wright, 2013). Broadcasters are treated as celebrities among their fans who watch their live streaming constantly. Because the popularity of most broadcasters is limited to a relatively small group of viewers, they are often labeled as microcelebrities. Different from the celebrity-fan interaction via traditional

social media, viewers of social live streaming are able to directly communicate with their beloved broadcasters in a face-to-face setting. To a large extent, broadcasters are the main reason for various viewer activities during social live streaming, such as selecting streaming channels, leaving comments, and giving (virtual) gifts (Bründl & Hess, 2016; Scheibe et al., 2016). M. Hu and associates (2017) conducted a survey among Chinese viewers of social live streaming and discovered that viewers' interactions with broadcasters accounted for a large portion of their media use experiences. This is consistent with the existing finding from the traditional media context that media figures have significant influence on audience behavior pertaining to media selection and consumption (Erdogan, 1999). Heo, Kim, and Yan (2020) also suggest that SLSS uses novel and interesting content to enable active networking between viewers and broadcasters. Given that the current industry of social live streaming is primarily pleasure oriented (Bründl et al., 2017), this study conceptualized viewers' experiences with broadcasters as *enjoyment with broadcasters* to reflect the hedonic nature of this media format.

What factors influence viewers' enjoyment with broadcasters? To answer this question, we explored potential antecedents based on the theoretical framework of the U&G approach. U&G argues that individuals actively choose certain media content to gratify their specific needs (Katz et al., 1974). In other words, individuals' media-use behavior is largely determined by their motives that are based on need gratification (Rui & Stefanone, 2016). Although originally developed in the traditional media environment, U&G has been recognized as one of the major theoretical frameworks in explaining user behavior in digital media (Chaffee & Metzger, 2001). This is because digital users have increased control over their media consumption such as what media platforms to use, as well as when and how to use them, making the investigations on motives and need gratification even more important to understanding the usage of digital media (Ruggiero, 2000).

U&G has been adopted to guide previous studies of social live streaming, but the emphasis has been mainly on broadcasters such as broadcasters' motivation to stream live (see Bründl & Hess, 2016, Friedländer, 2017). For example, Hilvert-Bruce, Neill, Sjöblom, and Hamari (2018) identify six motivations to explain viewers' live-stream engagement: social interaction, sense of community, meeting new people, entertainment, information seeking, and lack of external support in real life. It remains largely unknown what motivates viewers to watch social live streaming, especially what drives their enjoyment with broadcasters. As discussed previously, viewers normally engage in three main activities during the process of social live streaming, including video watching, social interactions, and (virtual) gift giving (Scheibe et al., 2016). These activities are believed to gratify two major needs of media users, namely, social interaction and entertainment seeking. Specifically, viewers are motivated to watch social live streaming because this media format offers them real-time interactions with the broadcasters they like and with other viewers who share the same interests. One's interaction with other viewers is mainly through text-based chatting, but his/her interaction with the broadcaster is more like a face-to-face conversation. Because viewers ordinarily choose the streaming channels of their favored broadcasters, their social interaction motive in general is expected to facilitate their enjoyment with the broadcasters. Moreover, online video watching is enjoyable under lots of circumstances (J. Lee & Lee, 2011; Schneider, Weinmann, Roth, Knop, & Vorderer, 2016). During social live streaming, (virtual) gift giving brings increased enjoyment to viewers, as broadcasters make every effort to entertain their fans in order to get rewarded. Given that previous research has identified that social live streaming is primarily a hedonic media platform (Bründl et al., 2017), we expected that

entertainment seeking would another important viewer motive that would be positively influence viewers' enjoyment with broadcasters. Formally, the following hypotheses were proposed:

H1: Viewers' (a) entertainment-seeking motive and (b) social interaction motive will positively influence their enjoyment with broadcasters of social live streaming.

In addition, we also expected a relationship to exist between viewers' social interaction motive and entertainment-seeking motive pertaining to watching social live streaming. Although rich literature can be found exploring various motives of using social media based on U&G (Cheung, Chiu, & Lee, 2011; Whiting & Williams, 2013), insufficient effort has been taken to understand the relationships among these motives. In the context of social live streaming, interacting with broadcasters and other viewers is entertaining in most cases (Bründl et al., 2017). Accordingly, this study predicted that once a viewer has a strong motive to interact with others via social live streaming, he or she would also expect that such social interactions would gratify their need for entertainment (i.e., triggering the entertainment-seeking motive). Formally, the following hypothesis was proposed:

H2: Viewers' social interaction motive will positively influence their entertainment-seeking motive when they watch social live streaming.

Parasocial Relationship

Parasocial relationship is an illusionary social relationship with demonstrations of human beings appearing in the media content developed by mass media audiences (Giles, 2002). When engaging in a parasocial interaction, audiences believe that they have a direct relationship with a media figure, such as a celebrity, and consider the media figure a friend. However, parasocial relationship is not real because of the lack of actual social interactions between audience and media figures (Labrecque, 2014). The emergence of digital media makes two-way communication between audience and media figures technically possible, leading to an ongoing debate of whether parasocial relationship still exists in the online environment. On the one hand, some scholars argue that "the parasocial aspects of television soap opera viewing may soon pale in comparison to the interactive relation possibilities offered by electronic chat rooms and multiuser domains" (Ruggiero, 2000, p. 14). On the other hand, some believe that parasocial relationship may become even stronger in digital media because of users' direct interactions with media figures, such as sending and receiving messages on social media (Labrecque, 2014). For instance, Gong and Li (2017) confirm the formation of parasocial relationship between microblog readers and bloggers, which significantly influences the microblogger's endorsement effectiveness when it comes to influencer marketing using microblogs. What is more, parasocial relationship serves as a mediator of the effect of source (microblogger) attractiveness on endorsement effectiveness (Gong & Li, 2017).

M. Hu and colleagues (2017) examined the parasocial relationship with broadcasters of Chinese users of social live streaming. The face-to-face-like communication between viewers and broadcasters actually makes it easier to build strong relationships with broadcasters, which viewers often consider "friendships." Zimmer, Scheibe, and Stock (2018) also argue that SLSS-mediated interaction between broadcasters and viewers is "closer to 'normal' social interaction than to parasocial interaction" (p. 439) on

other media. Although broadcasters and viewers do interact mutually during social live streaming, such "friendships" are not truly social as in most cases broadcasters face hundreds, thousands, or even tens of thousands of viewers at the same time and they could hardly form a real personal relationship with each individual viewer. As claimed by M. Hu and associates (2017), "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" (p. 596). Therefore, the relationships with broadcasters formed by viewers are still parasocial to a large extent. The so-called two-way communication during social live streaming is mostly temporary and is very likely to create an illusion of relationships.

Given that one's parasocial relationship developed in social live streaming would not exist without a beloved broadcaster, we expected that viewers' enjoyment with the broadcaster would be a significant driving force for forming a parasocial relationship. This prediction is based on the existing findings from both traditional and digital media environments that one's engagement with media figures intensifies his/her experience of a parasocial relationship (Hartmann & Goldhoorn, 2011; A. M. Rubin & Step, 2000; R. B. Rubin & McHugh, 1987). Given the pleasure orientation of social live streaming (see Bründl et al., 2017), enjoyment accounts for a large portion of viewers' engaging experiences with broadcasters. Therefore, we proposed the following hypothesis:

H3: Viewers' enjoyment with broadcasters will positively influence their parasocial relationship with the broadcasters when they watch social live streaming.

Consequences of Watching Social Live Streaming

The existing literature has articulated the positive impact of media consumption (Ellison, Steinfield, & Lampe, 2007; Tamborini, Bowman, Eden, Grizzard, & Organ, 2010); however, the negative influences of media usage, especially digital media usage, have also attracted adequate academic attention. For example, loneliness and addiction have been identified as the undesired outcomes of computer-mediated communication (Hardie & Tee, 2007; Kim et al., 2009). As discussed previously, the primary goal of this study was to understand the negative consequences of watching social live streaming. Because this innovative media format has been largely criticized for stimulating excessive media usage and isolating viewers from authentic social interactions (Roberts, 2017), we examined loneliness and addiction as the adverse results of watching social live streaming in this study.

Previous research of social media usage has discovered that parasocial relationships exert a negative impact on individuals (Baek, Bae, & Jang, 2013). This is because parasocial relationships are often formed by media users to compensate for their unsatisfactory social relationships in real life (McQuail, Golding, & De Bens, 2005). According to Giles (2002), disconnection from social groups and heavy media consumption result from one's indulgence in parasocial interactions with media figures. Analogously, social media users' reliance on parasocial relationship is also positively related to loneliness, interpersonal distrust, and addictive usage of social media (Baek et al., 2013). Given that viewers are very likely to form parasocial relationships with broadcasters in social live streaming because of the illusionary two-way communication provided by this media format, we expected that the negative consequences (i.e., loneliness and addiction) would result from such parasocial relationships. In other words, when viewers attempt to seek

compensations for unsatisfactory real-world relationships through the indulgence in parasocial interactions with broadcasters, their likelihood to experience loneliness and to engage in excessive consumption of social live streaming would be expected to increase. Formally, the following hypotheses were proposed:

H4: Viewers' parasocial relationship with broadcasters will positively influence their (a) perceptions of loneliness and (b) addiction to social live streaming.

The impact of loneliness on individuals' addictive usage of digital media has been confirmed in diverse cultural contexts by prior studies (Bozoglan, Demirer, & Sahin, 2013; Kim et al., 2009; Zhou & Leung, 2012). Human beings have the innate need for social belongingness (Baumeister & Leary, 1995). When such a need cannot be satisfied in the offline environment, individuals turn to the online environment and immerse themselves in the virtual world that gratifies their social needs (Kim et al., 2009). We expected a similar impact of loneliness on viewers' addiction to social live streaming because the affordances of this media format would make lonely people feel included and thus trigger excessive media consumption. Formally, the following hypothesis was proposed (see Figure 1 for the proposed conceptual model):

H5: Viewers' perceptions of loneliness will positively influence their addiction to social live streaming.

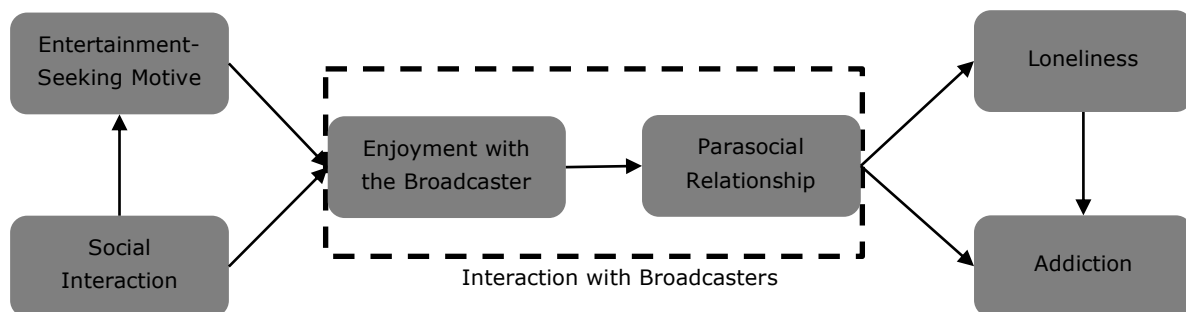


Figure 1. The conceptual model.

Method

Procedure

An online survey was conducted among current social live streaming viewers in China who were recruited from several Chinese universities. This sample of college students is believed to be appropriate for this study because contemporary live streaming viewers are young people, with half of them under 30 years of age and about one quarter under 25 ("Live Streaming in China," 2017). Respondents were provided with a Qualtrics link, which took them to the survey where they answered some questions about their experiences of watching social live streaming. Participants' demographic information was collected at the end of the survey. A filter question was asked at the beginning of the survey to ensure that only current viewers of social live streaming were recruited for this study. Before filling out the questionnaire, qualified participants were asked to think of their own experiences of watching social live streaming that featured the broadcasters with whom they most frequently interacted.

Participants

In total, 244 Chinese social live streaming viewers successfully completed the survey. Among these participants, 48.8% ($n = 119$) were male, and 51.2% ($n = 125$) were female. The mean age of participants was 21.64 years ($SD = 3.49$). As for education, 72.9% ($n = 178$) had some college credit, 14.3% ($n = 35$) had a bachelor's degree, 11.1% ($n = 27$) had a master's degree, and 1.6% ($n = 4$) had a doctorate. See Table 1 for the full profile of respondents.

Table 1. Respondent Profile.

Variable	<i>n</i>	%
Gender		
Male	119	48.8
Female	125	51.2
Age (years)		
17–24	198	81.1
25–30	42	17.2
≥30	4	1.6
Education		
College credit	178	72.9
Bachelor's degree	35	14.3
Master's degree	27	11.1
Doctorate degree	4	1.6
Living fee per month (¥)		
≤500	5	2.0
501–1,000	43	17.6
1,001–1,500	76	31.1
1,501–2,000	48	19.7
≥2,001	70	28.7
Missing	2	0.8
Live broadcasting per day (minutes)		
0–14	197	80.7
15–29	18	7.4
30–44	12	4.9
45–59	13	5.3
≥60	4	1.6

Measures

All measures were self-reported on a 7-point scale and modified to specifically reflect the context of social live streaming (see Table 2).

Table 2. Original Measurement Items.

Item	Item content
Entertainment-seeking motive: 1 (<i>strongly disagree</i>) to 7 (<i>strongly agree</i>)	
ESM_1	Watching social live streaming is entertaining.
ESM_2	I just like to watch social live streaming.
ESM_3	Watching social live streaming is enjoyable.
Social interaction motive: 1 (<i>strongly disagree</i>) to 7 (<i>strongly agree</i>)	
SIM_1	I watch social live streaming in order to interact with a number of people.
SIM_2	I watch social live streaming to maintain a good relationship with others (for networking).
SIM_3	I watch social live streaming to connect/meet with people who share similar interests.
Enjoyment with the broadcaster: 1 (<i>strongly disagree</i>) to 7 (<i>strongly agree</i>)	
EB_1	Watching the broadcaster's live streaming offers me relaxation when pressures build up.
EB_2	Participating in the broadcaster's live streaming is one of the most satisfying things I do.
EB_3	I really enjoy interacting with the broadcaster.
Parasocial relationship: 1 (<i>strongly disagree</i>) to 7 (<i>strongly agree</i>)	
PR_1	Watching social live streaming makes me feel comfortable, as if I am a friend with the broadcaster.
PR_2	When I interact with the broadcaster, I feel included.
PR_3	I can relate to the broadcaster.
PR_4	I like hearing what the broadcaster has to say.
PR_5	I care about what happens to the broadcaster.
PR_6	I hope the broadcaster can achieve his/her goals.
Loneliness: 1 (<i>never</i>) to 7 (<i>always</i>)	
LL_1	How often do you feel that you lack companionship?
LL_2	How often do you feel left out?
LL_3	How often do you feel isolated from others?
Addiction: 1 (<i>strongly disagree</i>) to 7 (<i>strongly agree</i>)	
ADT_1	Frequently, I regret I consume too much time using social live streaming service.
ADT_2	If I could not use social live streaming service, I would be depressed.
ADT_3	If I stopped using social live streaming, my social relationships would be ruined.

Entertainment-seeking motive was measured adopting three items from Papacharissi and Rubin (2000). Social interaction motive was measured adopting three items from E. Lee, Lee, Moon, and Sung (2015). Enjoyment with the broadcaster was measured adopting three items from Kyle and Mowen (2005). Parasocial relationship was measured adopting six items from A. M. Rubin, Perse, and Powell (1985). Loneliness was measured

adopting three items from Hughes, Waite, Hawkey, and Cacioppo (2004). Addiction was measured adopting three items from Baek and colleagues (2013). The questionnaire was translated into Chinese by a scholar fluent in both English and Chinese and was unaware of the research purpose. Then the Chinese version of the questionnaire was back-translated into English by another scholar fluent in both languages and was not informed of the research purpose. The researchers compared the two English versions of the questionnaire (i.e., the original one and the back-translated one) and found that they were highly consistent except for some minor wording differences.

Data Analysis

We first examined reliability, convergent validity, and discriminant validity of all measures based on confirmatory factor analysis (CFA) using AMOS. Then we tested the hypothesized relationships among the latent variables via structural equation modeling analysis using AMOS.

Results

Measurement Model

A first-order CFA was conducted to test the fitness of the measurement model for the latent variables. The initial model fit for the CFA model was not desirable, so the standardized regression weights were examined for each item. One entertainment-seeking motive item (i.e., ESM_1), one social interaction motive item (i.e., SIM_3), one enjoyment with the broadcaster item (i.e., EB_1), two parasocial relationship items (i.e., PR_4, PR_6), and one addiction item (ADT_1) were deleted because they did not exceed the recommended .70 threshold weight. The revised CFA model had desirable model fit based on the recommendations from Hair (2010) and Hooper, Coughlan, and Mullen (2008). Specifically, the goodness of fit indices for the revised CFA model ($\chi^2 = 159.148$, $df = 74$, $\chi^2/df = 2.151$; goodness of fit index [GFI] = 0.922; normed fit index [NFI] = 0.931; comparative fit index [CFI] = 0.962; root mean square error of approximation [RMSEA] = 0.069) indicated satisfactory fit for the data.

Standardized loading, Cronbach's alpha, composite reliability (CR), and average variance extracted (AVE) estimate were used to assess reliability and convergent validity of the measures (see Table 3). Standardized loadings ranged from .78 to .94, which were highly significant. Cronbach's alpha ranged from .82 to .90, all exceeding the minimum limit of .70 (Chin, 1998). CRs ranged from .82 to .91, all exceeding the minimum limit of .70 (Hair, 2010). AVE estimates ranged from .65 to .80, all exceeding the recommended minimum limit of .50 (Fornell & Larcker, 1981). Therefore, all constructs in the measurement model had significant reliability and convergent validity.

Table 3. Construct Reliability and Validity.

Construct	Item	Standardized loading	α	CR	AVE
Entertainment-seeking motive	ESM_2	.87	.82	.82	.69
	ESM_3	.79			
Social interaction motive	SIM_1	.83	.83	.83	.71
	SIM_2	.85			
Enjoyment with the broadcaster	EB_2	.82	.85	.85	.74
	EB_3	.90			
Parasocial relationship	PR_1	.87	.90	.91	.71
	PR_2	.86			
	PR_3	.84			
	PR_5	.79			
Loneliness	LL_1	.78	.85	.85	.65
	LL_2	.82			
	LL_3	.81			
Addiction	ADT_2	.94	.89	.89	.80
	ADT_3	.85			

Note. See Table 2 for item abbreviations.

To test discriminant validity, the square root of AVE was calculated for each construct and was compared with its correlation coefficients with other constructs (see Table 4). The comparison results showed that all diagonal numbers (i.e., the square root of AVE) were larger than the corresponding off-diagonal numbers (i.e., correlation coefficients), indicating adequate discriminant validity.

Table 4. Correlations and Discriminant Validity.

Variable	Entertainment-seeking motive	Social interaction motive	Enjoyment with the broadcaster	Parasocial relationship	Loneliness	Addiction
Entertainment-seeking motive	.831 ^a					
Social interaction motive	.354**	.843 ^a				
Enjoyment with the broadcaster	.512**	.544**	.860 ^a			
Parasocial relationship	.475**	.563**	.703**	.843 ^a		
Loneliness	.158*	.191**	.147*	.282**	.806 ^a	
Addiction	.231**	.450**	.318**	.512**	.325**	.894 ^a
<i>M</i>	4.135	3.320	3.730	3.454	3.858	2.377
<i>SD</i>	1.394	1.538	1.517	1.369	1.308	1.576

^aThe square root of AVE.

* $p < .05$. ** $p < .01$.

Structural Equation Model

Based on the validated measurement model, the proposed conceptual model was tested using SEM. The following indices were employed to estimate the model fit: χ^2/df (<5; Hooper et al., 2008), GFI (>0.90; Hooper et al., 2008), NFI (>0.90; Bentler, 1992), CFI (>0.90; Bentler, 1992), and RMSEA (<0.08; L. Hu & Bentler, 1999).

The goodness-of-fit indices for the conceptual model were $\chi^2/df = 2.273$, GFI = 0.905, NFI = 0.920, CFI = 0.953, RMSEA = 0.072. All model-fit indices exceeded the suggested acceptance levels, demonstrating that the model presented a good fit with the current data. Therefore, the path coefficients were then examined for testing hypotheses (see Figure 2).

Path Analysis

Hypothesis 1a predicted that the entertainment-seeking motive would positively influence enjoyment with the broadcaster. The results indicated that the entertainment-seeking motive positively influenced enjoyment with the broadcaster, $\beta = .404$, $SE = .088$, $p < .001$. Therefore, Hypothesis 1a was supported.

Hypothesis 1b predicted that the social interaction motive would positively influence enjoyment with the broadcaster. The results indicated that the social interaction motive positively influenced enjoyment with the broadcaster, $\beta = .516$, $SE = .076$, $p < .001$. Therefore, Hypothesis 1b was supported.

Hypothesis 2 predicted that the social interaction motive would positively influence the entertainment-seeking motive. The results indicated that the social interaction motive positively influenced the entertainment-seeking motive, $\beta = .434$, $SE = .068$, $p < .001$. Therefore, Hypothesis 2 was supported.

Hypothesis 3 predicted that enjoyment with the broadcaster would positively influence parasocial relationship. The results indicated that enjoyment with the broadcaster positively influenced parasocial relationship, $\beta = .824$, $SE = .061$, $p < .001$. Therefore, Hypothesis 3 was supported.

Hypothesis 4a predicted that parasocial relationship would positively influence loneliness. The results indicated that parasocial relationship positively influenced loneliness, $\beta = .301$, $SE = .072$, $p < .001$. Therefore, Hypothesis 4a was supported.

Hypothesis 4b predicted that parasocial relationship would positively influence addiction. The results indicated that parasocial relationship positively influenced addiction, $\beta = .490$, $SE = .082$, $p < .001$. Therefore, Hypothesis 4b was supported.

Hypothesis 5 predicted that loneliness would positively influence addiction. The results indicated that loneliness positively influenced addiction, $\beta = .204$, $SE = .072$, $p < .01$. Therefore, Hypothesis 5 was supported.

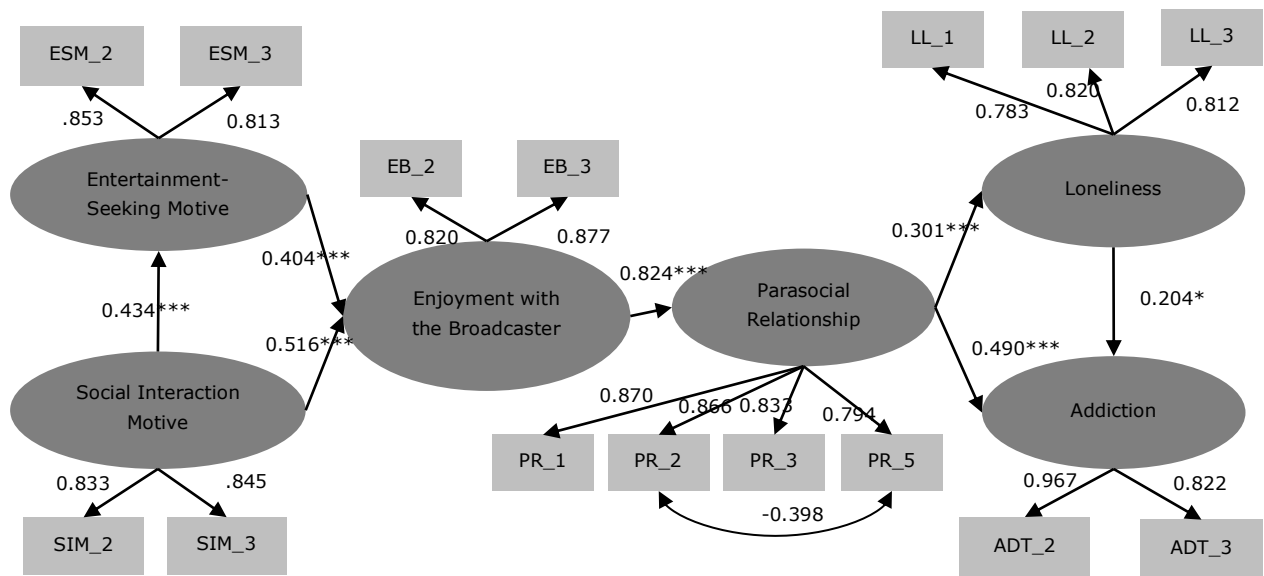


Figure 2. The structural equation model with path coefficients. See Table 2 for item abbreviations. * $p < .05$. ** $p < .01$. * $p < .001$.**

Discussion

As an emerging digital media technology, social live streaming represents the current trend of media convergence and thus deserves much research attention. However, the existing literature has not taken adequate effort to analyze this new media format, especially from the viewers' perspective. The present study tested a conceptual model to understand the negative consequences of watching social live streaming on individual viewers. The results indicate that viewers' perceptions of loneliness and addiction to social live streaming are brought by their parasocial relationship with broadcasters, which is influenced by the enjoyment they get during the interactions with the broadcasters. Loneliness was also found to directly influence the extent to which viewers are addicted to social live streaming. This study also identified some antecedents to viewers' interactions with broadcasters. In particular, one's entertainment-seeking and social interaction motives are positively associated with his/her enjoyment with a specific broadcaster. There is also a relationship between these two types of motives. These findings are believed to offer interesting insights into the impact of social live streaming on individual viewers and thus contribute to the literature of digital media effects and human-computer interactions.

Theoretical Implications

A key contribution of this study is to understand the negative impact of social live streaming on individual viewers. It responds to the recent call for more research on this emerging media format from the perspective of viewers (see Zhao, Chen, Cheng, & Wang, 2018). The proposed conceptual model showcases how watching social live streaming leads to undesirable outcomes (i.e., loneliness and addiction) among viewers, providing theoretical and empirical evidence to support the current criticism on this innovative

media technology in the Chinese society. From a broader standpoint, this study reveals the dark side of human-computer interaction and recognizes the importance of improving users' psychological well-being in the current digital era.

Self-determination theory has been used to study people's intrinsic and extrinsic motives of media consumption (Ryan, Rigby, & Przybylski, 2006). Zhao and associates (2018) applied self-determination theory to studying why broadcasters continuously conduct social live streaming. In their model, entertainment seeking as an intrinsic motive and social interaction as an extrinsic motive are both important factors that influence broadcasters' experiences and behaviors. The current study extends Zhao and colleagues' work by exploring viewers' intrinsic and extrinsic motives in watching social live streaming. More important, the extrinsic motive (i.e., social interaction) was found to influence the intrinsic motive (i.e., entertainment seeking) among viewers of social live streaming. This finding provides some interesting insights into the employment of self-determination theory in studying human behavior in digital media. Although this does not mean that extrinsic motives determine the activation of intrinsic motives, it implies that certain affordances of digital media (e.g., the salient social function of social live streaming) would strengthen some intrinsic motives (e.g., entertainment-seeking motive) of online users through energizing some extrinsic motives (e.g., social interaction motive). Therefore, a plausible research direction for future investigations on social live streaming or digital media in general is to explore the relationships among user motives under the guidance of self-determination theory.

The majority of prior studies guided by U&G focus on audiences' motives driven by need gratification, with relatively less attention paid to the outcomes of media usage and the psychological process in between. The present study thus contributes to the U&G literature by emphasizing the importance of taking the entire process of media usage into account, including the antecedents, mediating procedures, and consequences. This is consistent with Ruggiero's (2000) claim that "the media uses and effect process is an increasingly complex one that requires careful attention to antecedent, mediating, and consequent conditions" (p. 13). We believe that the theoretical framework of U&G would be more powerful in explaining the complex digital media phenomena as media theorists continually expand this framework to cover the outcomes and psychological mediators of media usage.

There is a voice in the media literature questioning the existence of parasocial relationships in the digital environment. It is because a parasocial relationship is one-sided and the two-way communication granted by digital media should have eliminated such a unidirectional relationship (Ruggiero, 2000). However, we found that parasocial relationship is an important component of viewers' interaction with broadcasters in social live streaming, which is representative of the rapidly developing digital media ecosystem. The existence of two-way communication in digital media does not necessarily prevent the formation of parasocial relationships (Gong & Li, 2017; Labrecque, 2014). An authentic social relationship, like friendship, should be communal (Clark & Taraban, 1991). Although viewers of social live streaming have the opportunities of directly communicating with broadcasters, their relationships are not communal as (1) the broadcasters do not see each individual viewer during the streaming process and (2) the broadcasters do not know each viewer in person and do not keep communicating with viewers outside the streams. Therefore, the theoretical contribution of this study to the literature on parasocial relationships is that two-

way communication is not an obstacle to the formation of parasocial relationships and communication theorists may need to reconsider the preconditions of this unidimensional relationship in digital media.

Some previous research has found that online social interaction may reduce loneliness by providing users with online social support (see Valkenburg & Peter, 2009). However, our study found that it does not occur in social live streaming, even though the social function of this media platform is salient. Consistent with our findings, Hilvert-Bruce and colleagues (2018) discovered that to gain social support and to reduce social anxiety were not associated with viewers' engagement in social live streaming. The present conceptual model implies that viewers are motivated by their social needs to interact with broadcasters, but such interactions may not necessarily compensate for their unsatisfied social relationships in real life. This seemingly self-contradictory phenomenon may not be uncommon in the digital environment and deserves more research attention.

Practical Implications

In addition to the aforementioned theoretical contributions, this study also provides some useful suggestions to practitioners and industry regulators in terms of better understanding and protecting viewers of social live streaming. Although most service providers in this industry are profit-driven and are eager to attract more viewers by having them engage in interactions with broadcasters, service providers need to understand that viewers' indulgence in the imaginary relationship with broadcasters could impair their psychological well-being, leading to some personal or social problems. Therefore, service providers of social live streaming are suggested to pay more attention to their social responsibility and take efficient actions to protect their viewers. For example, service providers could send messages to viewers from time to time to remind them that their online interactions with broadcasters cannot replace the social relationships in their real lives. For industry regulators, the biggest takeaway from this study is the knowledge of what leads to the negative impact of social live streaming on viewers. Based on the findings that parasocial relationship is the driving force of increased loneliness and digital media addiction among viewers, regulators could set up specific policies to prevent the formation of parasocial relationship from the beginning. For example, regulations could be through limiting the time of one viewer's interaction with one broadcaster and the maximum amount of money and gifts one can spend on a specific broadcaster.

For the viewers of social live streaming, this study informs them how they could get hurt by using this emerging digital media technology. Viewers are thus encouraged to protect themselves by keeping a psychological distance from broadcasters. Given that the current viewer population is composed of a large number of adolescents, the findings of this study would be meaningful to parents who worry about the negative impact of digital media on their children. Specifically, one of the useful ways suggested by this study to battle the negative impact of social live streaming is to improve teenagers' social skills in the offline environment so that they would not turn to the virtual interactions with broadcasters to compensate for unsatisfied social relationships.

Limitations and Future Research

The present study does have some shortcomings that can be addressed in future investigations. First, the survey was conducted online. The researchers had no control over the environment in which respondents completed the questionnaire. Second, the survey was based on a nonprobability sample, so the generalization of the findings to a larger population of viewers of social live streaming in China is questionable to some extent. Even though college students are considered the mainstream viewers of social live streaming, other demographic groups could be taken into consideration in future studies. Third, the present study did not differentiate the impact of various genres of live streaming content. Yu, Jung, Kim, and Jung (2018) found that viewers' gift-giving behavior when they watch talks, eating/cooking, and music contents in social live streaming is different from that when they watch sports, news, and finance content. M. Hu and associates (2017) also found that "live streaming genres partially moderate the impact of identification on continuous watching intention" (p. 594). Therefore, it is highly possible that viewers' parasocial relationship with broadcasters and its impact would be different contingent on the genres of the streaming content. Future research is suggested to examine this topic. Fourth, culture has been identified as an important factor that influences individuals' need gratifications (Ruggiero, 2000). Given that social live streaming has become increasingly popular in the Western world, future investigations might explore the role of culture in people's usage of social live streaming by comparing viewer responses from different cultures. Last but not the least, this study confirmed the entertainment-seeking motive as one of the antecedents of viewers' interactions with broadcasters, but did not explore the nuances of this broad construct of need gratification. According to Vorderer, Klimmt, and Ritterfeld (2004), escapism and mood management are important underlying dimensions of enjoyment. Future research might further explore why viewers interact with broadcasters for enjoyment.

Conclusion

Social live streaming, as one of the most popular new media technologies in China, has attracted a lot of attention and criticism. The present study has presented a conceptual model to understand the negative consequences of watching social live streaming on individual viewers. Our findings point to enjoyment and parasocial relationship with broadcasters as the key contributors to viewers' loneliness and addictive media usage. We hope that these preliminary findings will attract more communication researchers to investigate the dark side of emerging communication technologies as well as encourage practitioners to take serious actions to protect digital media users.

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