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SOCIAL TELEVISION AND LOCUS OF CONTROL: INTERACTIVITY EFFECTS ON COGNITION AND BEHAVIOR

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We examined the effects on users' cognition and behavior of an interface cue for level of interactivity that is presented on secondary screens in a social television environment. Our primary focus was on the social role of television watching, the effects of an interactivity cue on user perception, and user behavior outcomes. In addition, we examined how locus of control, as an individual characteristic, influenced these aspects. Participants (52 undergraduate students in Korea) communicated with other viewers through a secondary device while watching a television show. We found that the presence of an interface cue for interactivity was positively related to users' perceptions, such as sense of presence and sense of community. Additionally, the relationship differed based on personal characteristics. Overall, the effect of an interface cue on social television users' attitude and behavior is mediated by sense of community.

Keywords: social television, interactivity, interface cue, locus of control, sense of presence, sense of community.

As new media technologies have become more dominant in peoples' daily lives, a dramatic change in television-watching patterns has occurred (Shin, 2013). Before the Internet age, people gathered physically to watch television or perhaps discussed a program that they had watched the previous day.

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Advancing technology continues to accelerate the phenomenon of isolation through interactive television combined with traditional television and interactive technology (Harboe et al., 2008).

However, these changes do not signify the end of the social role of television watching. Recent researchers have asserted that television is a source of social communication that builds social bonds (Shin, 2013). It may be easy to stay informed about shared television content by converging traditional media with networked technology (Chorianopoulos & Lekakos, 2008). Although people may be physically alone when watching television, they can still communicate and interact with other viewers through new communication technologies, such as mobile devices, which have introduced innovative ways of sharing content.

Ducheneaut, Moore, Oehlberg, Thornton, and Nickell (2008) conducted a television-watching experiment and verified that the pattern of communication among viewers in the mediated and collocated conditions was identical. The focal point for successful communication is not physical proximity but, rather, synchronicity of interaction, which enables people to share a communication goal (Dennis, Fuller, & Valacich, 2008).

Prior studies on social television have been focused on introducing the concept of system design (Coppens, Trappeniers, & Godon, 2004) or providing suggestions for system design (Ducheneaut et al., 2008), without developing a theoretical background. It is important to investigate what aspects of this new television-watching trend encourage viewers to take part in socializing (Chorianopoulos & Lekakos, 2008), and how technological features affect users' cognition and behavior. Among various facets, interactivity is one of the most notable (Rafaeli & Ariel, 2007; Shin, Hwang, & Choo, 2013; Sundar, 2004) in distinguishing new from traditional media technology. Accordingly, we believe that a crucial point of social television resides in interactivity via the secondary devices that people use for communication.

Additionally, the psychological mechanisms of people using networked communication technology can vary depending on personal traits, such as locus of control (Kim & Sundar, 2011; Nonnecke & Preece, 2001). Focusing on the social role of television watching, we considered it significant to examine the personality traits of television viewers during interaction with others that, in turn, influence their psychological factors.

Accordingly, our aim in the current study was to investigate how an interface cue for level of interactivity that is shown on secondary screens in a social television environment influences users' cognition and behavior. We focused on the social role of television watching, the effects of interactivity cues on user perception and user behavior outcomes, and examined how locus of control, as an individual characteristic, influences these aspects.

Literature Review

Social Television

Social television is defined as a hybrid of television and a network system that enables people to connect socially with others (Shin, 2016). The social television concept focuses on connectivity when traditional television is combined with network systems (Shin & Kim, 2015), allowing people to share their experiences of television with other viewers through secondary devices that connect them whether or not the television itself is interactive (Cesar & Geerts, 2011; Coppens et al., 2004; Geerts & De Grooff, 2009; Harboe et al., 2008).

Ducheneaut et al. (2008) articulated the socializing of television watching through an experiment comparing collocated groups to remotely located groups in terms of fostering social interaction, and found that television viewers were interconnected in relation to the television show, regardless of where they were located. This finding suggests that the interactive features of systems promote connections and communication among viewers.

Interactivity

The most prominent feature of new media (e.g., the Internet) is *interactivity* (Sundar, 2004), which is created via threads of messages that enable people to take part in group communication (Rafaeli & Sudweeks, 1997; Sundar, Bellur, Oh, Jia, & Kim, 2016). Symbols, such as hyperlinks, buttons, and input boxes, attract people to take certain actions (Shin et al., 2013). A symbol that is embedded in the interface has its own meaning (Newhagen, 2004), and triggers a specific action (Sundar, Jia, Waddell, & Huang, 2015). In this sense, visual cues for interactivity on the interface are conducive to the social role of television (Chorianopoulos & Lekakos, 2008; Ducheneaut et al., 2008).

Research Question 1: What is the relationship between secondary screen interactivity and social television viewers' cognition and behavior?

Hypothesis 1a: Secondary screen interactivity will be positively related to perceived interactivity in a social television context.

Sense of Presence

The most important characteristic of social presence is a feeling of being connected to the environment despite not being there physically (Aspden & Helm, 2004; Hwang & Park, 2007; Steuer, 1992). Mobile devices enable people to be interconnected with others beyond time and space limitations (Dunlap & Lowenthal, 2009). Mobile device users tend to use virtual environments to share their thoughts when they notice the presence of others, which stimulates social interaction (Piyathasanan, Mathies, Wetzels, Patterson, & de Ruyter, 2015).

Hypothesis 1b: Secondary screen interactivity will be related positively to a sense of social presence in a social television context.

Sense of Community

People with common values seek to meet similar needs, priorities, and goals and these shared values enable community members to find ways of meeting their own needs and those of others, which is defined as *sense of community* (Rovai, 2002). This helps people take part in and accept the common values of a community (Blanchard, Welbourne, & Boughton, 2011). In addition, sense of community is not only affected by the features of a system but also determined by personal characteristics (Nonnecke & Preece, 2001).

Hypothesis 1c: Secondary screen interactivity will be positively related to a sense of community in a social television context.

Locus of Control

Locus of control (LOC) refers to the pivotal role in an issue (Rotter, 1966). People with *internal LOC* believe that they control the pivot of specific events, whereas people with *external LOC* believe that the effects of specific events are determined by external factors outside of their control. People who have relatively strong confidence in themselves tend to be more positive when they use information and communication systems than do those who believe more in the influence of the external world (Hsia, Chang, & Tseng, 2014; Potosky & Bobko, 2001). In addition, people with internal LOC believe in their own ability and so are reluctant to take notice of other entities while working on a task, meaning that it is quite stressful for people with internal LOC to be monitored in an external manner (Rickenberg & Reeves, 2000). In an online community, it is crucial for people with external LOC to share others' opinion or be informed of others' preferences (Kim & Sundar, 2011).

Research Question 2: Does LOC influence the relationship between secondary screen interactivity and viewers' cognition and behavior in a social television context?

Hypothesis 2a: Secondary screen interactivity and LOC will interact with perceived interactivity.

Hypothesis 2b: Secondary screen interactivity and LOC will interact with sense of social presence

Hypothesis 2c: Secondary screen interactivity and LOC will interact with sense of community.

Mediating Role of Perceptions

Interactivity based on information exchange has been found to be positively related to users' attitude and intention through their perception of the degree to

which the current message reflects previous ones (Sundar, Bellur, Oh, Jia et al., 2016). Further, sense of social presence was observed by Jin (2009) to mediate the relationship between an interface's modality and users' attitude toward information provided by a virtual agent. In addition, one's attitude toward an online community has been found to be influenced by the degree of interaction with others through a sense of community (Blanchard et al., 2011).

Hypothesis 3a: Perceived interactivity will mediate viewers' attitude toward content and communication, and their behavioral intention to use in a social television context.

Hypothesis 3b: Sense of social presence will mediate viewers' attitude toward content and communication, and their behavioral intention to use in a social television context.

Hypothesis 3c: Sense of community will mediate viewers' attitude toward content and communication, and their behavioral intention to use in a social television context.

Method

Participants

We recruited 52 undergraduate students enrolled at a comprehensive university in Seoul, South Korea. Participants took part in the experiment voluntarily by responding to an online announcement on the main website of the university. Females comprised 54% and males 46% of the sample, with ages ranging from 18 to 39 years (M = 22.4, SD = 1.95). All participants were well aware of the characteristics of the stimulus television show *Hidden Singer*. They were rewarded with US$3 for participating in the experiment.

Stimulus

A well-known Korean television show, *Hidden Singer*, was chosen as the study stimulus. In the show, several people, who are positioned behind a wall, sing the same song, and viewers must decide which of them is the original singer. The fake singer who receives the lowest number of points is eliminated from each round. A panel made up of the original singer's acquaintances also appraises the song. Through consultation with an expert group composed of professors, we determined that this program would be suitable to engender constructive conversations among viewers. A singer who we assumed would be relatively unknown to the young generation of participants was chosen for this experiment to minimize the effect of content. The stimulus was kept identical across group conditions.

The secondary screen interface was implemented on a Samsung Galaxy smartphone (YP-GI2), which was plugged into a 40-inch screen that showed

the comments and opinions of other viewers. It is crucial to be aware of other viewers on the screen to create the perception of a common social community in a social television context (Chorianopoulos & Lekakos, 2008).

Experimental Design and Procedure

A between-subjects experiment was designed to examine how an interface cue for level of interactivity with the secondary screens influences users' cognition and behavior. Participants were involved in the conversation among viewers through the mobile mock-up community (Figure 1).

Figure 1. *The concept of a virtual community for a social television system.*

Upon arrival at the computer laboratory, participants were asked to complete the scale items rating their LOC before taking part in the main experiment. They were then guided to the laboratory set, whereupon participants assigned to the interactive condition were asked to read other viewers' comments and told that they could post their own opinions to the community forum while watching the program. In contrast, participants in the noninteractive condition could only read the comments, not post opinions, while watching the show. The participants watched the edited show for approximately 12.5 minutes, comprising three 4-minute song rounds and two 15-second advertisements in between. Ducheneaut et al. (2008) reported that for a successful manipulation, it is necessary for viewers to have time to share the television content.

There were 20 lists of comments shown in the mock-up community, which were gathered from real viewers' online bulletin boards. Half of the comments were positive and the other half were a mix of negative and neutral. Participants in the interactive condition were allowed to input their own opinions via a "write" button. The experimenter replied to participants' comments immediately based on prepared scenarios, with anything outside the scope of the prepared responses being categorized as *other*, to guarantee the content of the conversation.

To assess LOC, participants responded to a series of statements before watching the experimental material. According to the results, they were split into two groups (internal vs. external LOC). The laboratory setting was similar to a normal living room, with a television set on the wall and a couch positioned in front of the television set.

Interactivity Manipulation

According to the procedure followed in previous studies (Sundar, Kalyanaraman, & Brown, 2003; Sundar & Kim, 2005), we manipulated the options available in the message threads. That is, the "write" button to post opinions was seen on the screen of the secondary device for participants in the interactive condition, whereas participants in the noninteractive condition could only read others' comments.

Measures

All measurement items were adopted from previous studies and revised for applicability to the social television context. The content validity of the revised and translated survey was carefully reviewed by four professors of communication and psychology, who also discussed and commented on translated terms for the local environment. All items were measured on a 7-point Likert scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*).

Locus of control. We adopted 24 items from Levenson and Miller's (1976) multidimensional LOC instrument for sociopolitical activists, which was adapted from a previous version (Levenson, 1974). The measure comprises three 8-item subscales: internal, powerful others, and chance. Internal LOC items relate to how much participants feel that they have control over some event in their lives ($\alpha = .73$). Powerful others LOC items relate to how much participants feel that events in their lives are decided by powerful others ($\alpha = .74$). Chance LOC items relate to how much participants feel that some events in their lives are determined by luck ($\alpha = .75$).

Perceived interactivity. We measured perceived interactivity by revising McMillan and Hwang's (2002) and Sundar and Kim's (2005) instruments. The four items were used to assess the degree to which participants believed that the interaction in social television context elicits communication ($\alpha = .82$).

Sense of presence. Sense of presence was measured by 11 items to assess how well participants felt that the social television community connected them with each other in terms of intimacy and involvement. The items were adopted from Nowak and Biocca's (2003) scale of perceived others' copresence and we also used an exploratory factor analysis to extract two indices in this study. Results of a confirmatory factor analysis for the 11 items also revealed that there were five items for intimacy presence ($\alpha = .83$) and five items for involvement presence ($\alpha = .76$), with one final item dropped.

Sense of community. Sense of community was measured by 10 items asking participants to evaluate the degree to which they felt the community supported sharing opinions, mutual influence, and fulfilling their needs ($\alpha = .75$; Chavis, 2008).

Attitude. Attitude toward the content was measured with nine items to assess the degree to which participants felt that the content of the show was favorable, appealing, interesting, and pleasant ($\alpha = .89$). Attitude toward communication was measured with 12 items to assess the degree to which participants felt that the communication among other viewers was favorable, appealing, persuasive, and informative ($\alpha = .93$). All items were adopted from Derbaix and Pecheux (2003), Sundar and Kim (2005), and Kim and Sundar (2011).

Behavioral outcomes. Interactivity of communication technology is associated with behavioral outcomes, such as satisfaction with, and acceptance of, the technology (Jiang, Chan, Tan, & Chua, 2010; Kim & Sundar, 2011; Sundar, Bellur, Oh, Xu, & Jia, 2014). Behavioral outcomes were measured by five items adopted from Shin (2010; $\alpha = .94$).

Results

We conducted a full factorial 2 (interactivity: no vs. yes) × 2 (LOC: low vs. high) analysis of variance (ANOVA), and we performed a path analysis to investigate the mediation effects proposed in Hypothesis 3. Pearson's correlation coefficient was computed before testing the hypotheses (see Table 1).

Table 1. *Pearson's Correlation Coefficients Among Variables*

Variables	1	2	3	4	5	6	7
1. PI	1						
2. SP_intimacy	.105	1					
3. SP_involve	.470**	.241	1				
4. SOC	.537**	.603**	.531**	1			
5. A_CON	-.031	.313*	.255	.250	1		
6. A_COM	.523**	.311*	.556**	.620**	.187	1	
7. BeH	.569**	.141	.351*	.439**	-.034	.750**	1

Note. PI = perceived interactivity; SP_intimacy = sense of intimacy presence; SP_involve = sense of involvement presence; SOC = sense of community; A_CON = attitude toward content; A_COM = attitude toward communication; BeH = behavior. * $p < .05$, ** $p < .01$.

The Effects of Interactivity on the Interface

As expected, the results revealed that there was a significant difference between the interactive ($M = 4.44$, $SD = 1.31$) and noninteractive ($M = 3.75$, $SD = 1.09$) groups in terms of sense of intimacy presence, $t(50) = 2.05$, $p = .045$, $d = 0.59$. There was also a significant difference between the interactive ($M = 4.17$,

SD = 0.77) and noninteractive (*M* = 3.45, *SD* = 0.74) groups in terms of sense of community, $t(50) = 3.44$, $p < .01$, $d = 0.97$. However, there was no significant difference between the interactive (*M* = 4.07, *SD* = 1.22) and noninteractive (*M* = 3.62, *SD* = 1.36) groups in terms of perceived interactivity, $t(50) = 1.26$, $p = .213$, $d = 0.36$. Therefore, Hypotheses 1b and 1c were supported but Hypothesis 1a was not.

Moderating Effect of LOC

The results showed a significant interaction between perceived interactivity and powerful others LOC, $F(1, 48) = 5.18$, $p = .027$, $\eta^2 = .097$. We conducted simple effects analyses and found that participants with low powerful others LOC reported a similar amount of perceived interactivity in both interactive (*M* = 3.48, *SD* = 1.11) and noninteractive (*M* = 3.78, *SD* = 1.28) conditions, $F(1, 48) = 0.42$, $p = .522$, $\eta^2 = .009$. In contrast, participants with high powerful others LOC showed greater perceived interactivity in the interactive condition (*M* = 4.65, *SD* = 1.06) than did those in the noninteractive condition (*M* = 3.39, *SD* = 1.48), $F(1, 48) = 6.26$, $p = .016$, $\eta^2 = .115$ (see Figure 2).

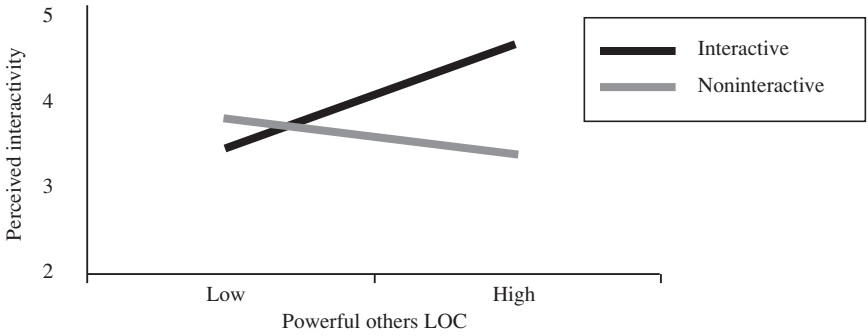

Figure 2. *Interaction effects between interactivity and powerful others LOC on perceived interactivity.*
Note. LOC = locus of control.

The results showed a marginally significant interaction between interactivity and chance LOC in terms of perceived interactivity, $F(1, 48) = 3.35$, $p = .074$, $\eta^2 = .065$. We conducted simple effects analyses and found that participants with low chance LOC reported a similar amount of perceived interactivity in both the interactive (*M* = 3.58, *SD* = 1.15) and noninteractive (*M* = 3.78, *SD* = 1.32) conditions, $F(1, 48) = 0.16$, $p = 0.69$, $\eta^2 = 0.003$. In contrast, participants with high chance LOC showed greater perceived interactivity in the interactive condition (*M* = 4.48, *SD* = 1.17) than did those in the noninteractive condition (*M* = 3.39, *SD* = 1.44), $F(1, 48) = 4.60$, $p = .037$, $\eta^2 = .088$ (see Figure 3). In sum, Hypothesis 2a was supported but Hypotheses 2b and 2c were not.

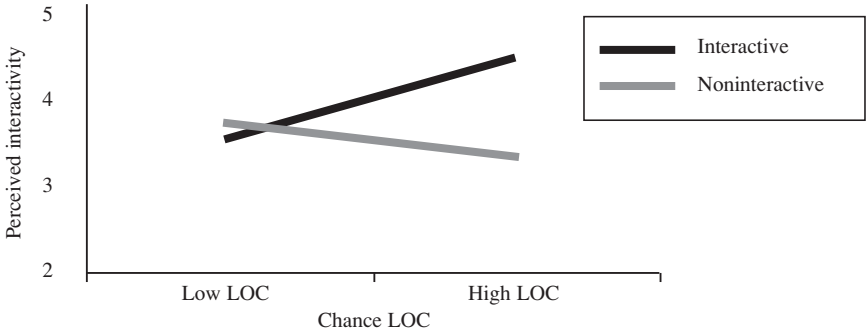

Figure 3. *Interaction effects between interactivity and chance LOC on perceived interactivity.* *Note*. LOC = locus of control.

Mediation Analysis

We tested the indirect effects among variables using the bootstrapping procedure with 5,000 resamples (Hayes, 2009; Preacher & Hayes, 2004). We dummy coded interactivity on the secondary screen based on the noninteractive condition.

The interaction effect between interactivity and powerful others LOC on sense of community was mediated by perceived interactivity. The interaction between interactivity and powerful others LOC was positively related to perceived interactivity, which increased sense of community (b = .71, R^2 = .19, odds ratio (OR) = 1.36, 95% confidence interval (CI) = [0.29, 1.14], standard error (SE) = .21). The interaction effect between interactivity and chance LOC on sense of community was mediated by perceived interactivity. The interaction between interactivity and chance LOC was positively related to perceived interactivity, which increased sense of community (b = .74, R^2 = .21, OR = 1.59, 95% CI = [0.33, 1.17], SE = .21; see Figure 4). Thus, Hypotheses 3a and 3b were supported.

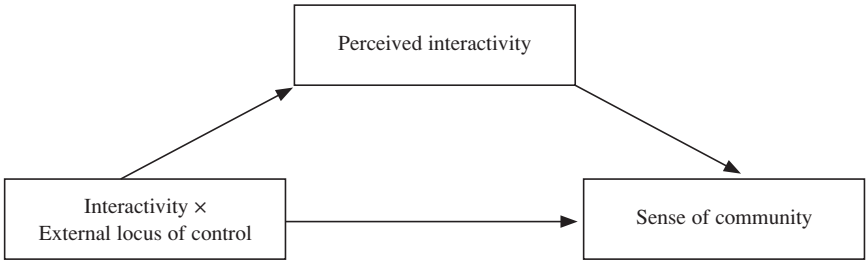

Figure 4. *Mediation effects of perceived interactivity on the relationship between interactivity and external LOC, and sense of community.*

In addition, sense of community mediated the relationship between perceived interactivity and both attitude toward communication (b = .43, R^2 = .27, 95% CI = [0.23, 0.63], SE = .10) and behavioral outcomes (b = .64, R^2 = .32, 95% CI = [0.38, 0.91], SE = .13; see Figure 5). Thus, Hypothesis 3c was supported.

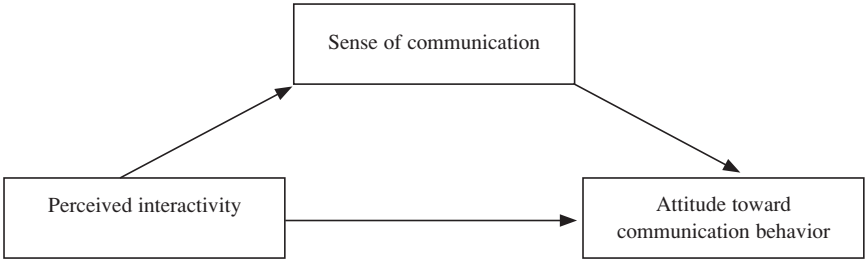

Figure 5. *Mediation effects of sense of community on the relationship between perceived interactivity and attitude toward communication and behavior.*

Discussion

In this study, we explored how an interface cue for enhancing interactivity on secondary screens in a social television environment affects users' psychological mechanism, thereby influencing users' attitude and behaviors. In addition, we examined how LOC as an individual characteristic influences these aspects. Prior studies on social television have been focused on technical features in a superficial way or on the system used, rather than on conceptualization based on theoretical frameworks. Therefore, we thought it necessary to consider what aspects of social television appeal to users.

First, the results confirmed that the level of interactivity with a secondary screen influences users' sense of intimacy presence, highlighting the fact that interface cues impact on users' cognition in a social television context. Participants in the interactive condition could exchange their opinions with other viewers via the secondary screen, creating the perception that they were connected and had a relationship with other people who watched the same show. We also found that the level of interactivity with the secondary screen impacted on sense of community, demonstrating that the interface cue made users feel that their participation in the community influenced other members with shared values.

In line with the results of Kim and Sundar (2011), our findings also indicate that users' perception mediates the relationship between interface cues and both attitude and behavior. More specifically, users evaluated their communication more positively when they felt a greater sense of community through the interface

cue, compared to those without the interface interaction cue. Further, they were more satisfied with their experience when they perceived that the communication evoked a sense of community through the interface cue, compared to participants without the interface interaction cue.

We also hypothesized that personal characteristics, such as LOC, would affect people's psychological mechanism regarding new media technology. The results supported this hypothesis; that is, we found an interaction effect between the level of interactivity and both powerful others and chance LOC types, on perceived interactivity. Powerful others and chance LOC are both forms of external LOC, meaning that people believe that the causes of events exist outside of their control. According to Kay (1990), people with external LOC believe that computer systems can affect their perception. In the current study, the two external LOC groups showed a different inclination in their perception of the two different situations, such that people with high external LOC were more sensitive to their outer world than were people with low external LOC. The result implies that slight alterations of computer systems could have significant impacts on some users' perception.

We believe it is noteworthy that an ontological interactive feature of an interface impacts on users' perception. The level of interactivity with the interface, controlling for external LOC, was found to affect sense of community through perceived interactivity. Visual cues shown on an interface entail messages (Newhagen, 2004), which can affect users' perception. In addition, we have confirmed that users' perception affects their cognition and behavior, in that perceived interactivity triggered users' positive attitude toward communication and behavior through sense of community.

A significant practical implication of this study is that positive attitudes and behaviors in relation to television watching were derived from the interactive features on the screen. This is key to providing opportunities for interaction with others in order to enhance the social role of television watching. Well-designed visual cues on an interface enable users to behave in natural ways. It is also remarkable that some users were found to be more sensitive to certain circumstances than were others. For example, people with high, vs. low, external LOC perceived more interactivity. This indicates that slight modifications to interfaces would be effective for targeting a specific user group.

Study Limitations and Directions for Future Research

We used a laboratory experiment to answer our research questions, which is unusual compared to a real-life situation (McLeod & Reeves, 1980). One aspect of this approach is that viewers in their natural context may not pay full attention to the content and often do other things while watching television, whereas the participants in this experiment were encouraged to focus solely on the content.

Further, participants watched the television content for only 12.5 minutes, which may have been insufficient.

Care should be taken in generalizing the findings of this study because the sample size was insufficient to represent the full population of social television consumers. The participants were not only from a young generation but were also university students who were familiar with new media technology and multitasking. It has been found to be common for them to use a secondary device while watching television (Shin, 2013), which might mean they experience low disturbance from secondary screens when focusing on television content. It is necessary to verify our results with participants from other backgrounds to generalize the findings to a wider social television user population.

In addition, the level of interactivity was differentiated only in terms of attitude toward the communication. This might be because the stimulus of the experiment was relatively popular in South Korea, despite the singer not being popular with the young generation, which meant that the mean of participants' attitude toward the content was high for both conditions. In the future, various genres of television content should be chosen to extrapolate more thoroughly the role of visual cues on the interface of social television.

Last, the experiment was conducted in South Korea. The television network infrastructure in South Korea is suitable to communicate with others synchronously without delay, and users' experience of social television is affected by these factors. Thus, the study should be conducted with participants from different cultures to increase the generalizability of the current findings.

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