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Understanding the uses and effects of interactive features in digital magazines

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ABSTRACT

In the context of digital magazines, this study investigates *why* higher levels of perceived interactivity improve consumers' attitudinal responses, and *which* interactive features have the ability to elicit these stronger interactivity perceptions. To examine this, a field experiment was conducted in which participants ($n = 197$) used a digital magazine with either 1) external communication features (facilitating social interactions on external platforms, like Facebook), 2) internal communication features (facilitating social interactions inside the digital magazine itself), or 3) no communication features. Results revealed that both feature types increased consumers' interactivity perceptions, but that the effects of the internal communication features were the strongest. Subsequently, mediation analyses revealed that the higher levels of perceived interactivity elicited stronger feelings of flow and enjoyment through which the positive findings of perceived interactivity on consumers' attitudinal responses can be explained.

Keywords: human-technology interaction; new media; digital marketing; perceived interactivity; digital magazines; new technologies.

INTRODUCTION

Digital magazines are commonly enriched by interactive features, like hyperlinks and social media buttons (Rauwers, Voorveld, & Neijens, 2016). Implementing these features can make people evaluate the magazine as more interactive (i.e., increasing levels of perceived interactivity), which subsequently translates into more positive digital magazine attitudes (Sundar & Kim, 2005; Wu, 2005). However, theory is still lacking about *why* these effects actually happen.

Flow experience and perceived enjoyment have both been suggested in the literature as underlying mechanisms of the above-mentioned perceived interactivity effects (Cyr, Head, & Ivanov, 2009; Van Noort, Voorveld, & Van Reijmersdal, 2012). Flow is a state of mind that can be experienced when being completely absorbed by an activity (Chen, Wigand, & Nilan, 2000; Csikszentmihalyi, 1975). Perceived enjoyment is a positive emotion elicited by solely the execution of an activity, regardless of any performance consequences (Davis, Bagozzi, & Warshaw, 1992; Kimiecik & Harris, 1996). Only the role of flow has been empirically tested before (Van Noort, et al., 2012); however, never in a real-life setting. This latter is important, as it has been argued that forced exposure methods can alter interactivity outcomes (Tremayne, 2005). Therefore, as the first research aim, this study uses a field experiment to examine the underlying mechanisms (i.e., flow experience and perceived enjoyment) of the effects of perceived interactivity on consumers' attitudinal responses within the context of digital magazines.

The second question that this study wants to address is *which* interactive features have the ability to make consumers evaluate the content as more interactive, as a higher number of interactive features does not automatically translate into stronger interactivity perceptions (Lee, Lee, Kim, & Stout, 2004; Voorveld, Neijens, & Smit, 2011). For instance, some interactive features that facilitate human-to-human interactions (i.e., human interactive features¹) increase consumers' interactivity perceptions (e.g., social media buttons), whereas others do not (e.g., a chat box; Voorveld, et al., 2011). More specifically, two types of human interactive features can be distinguished: external and internal communication features (Rauwers et al., 2016). In the case of external, all magazine-related social interactions take place on external platforms (e.g., the magazine's Facebook page), which enables both readers and non-readers of the magazine to participate in the online discussions. In contrast, in the case of internal, all communications occur inside the digital magazine, and thus solely between magazine readers. Since currently little is known about the difference in effect between external and internal communication features in increasing consumers' interactivity perceptions, this study examines this as a second aim.

¹Another form of interactivity in digital content is medium interactivity: Interactive features that give users, to a certain degree, control over the content (e.g., hyperlinks; Chung, 2008). This form is not examined in this study.

In sum, this study contributes to the current theoretical knowledge on the role of perceived interactivity in two ways: 1) It tests whether flow experience and perceived enjoyment mediate the relationship between perceived interactivity and consumers' attitudinal responses, and 2) it examines the differences in effect between external and internal communication features on and through perceived interactivity (see Figure 1). This knowledge is also of value for digital content publishers, as it provides insights into whether adding human interactive features (i.e., external or internal communication features) in digital magazine content could improve consumers' reading experiences (i.e., by eliciting sensations of flow and enjoyment), and attitudinal responses towards the digital magazine.

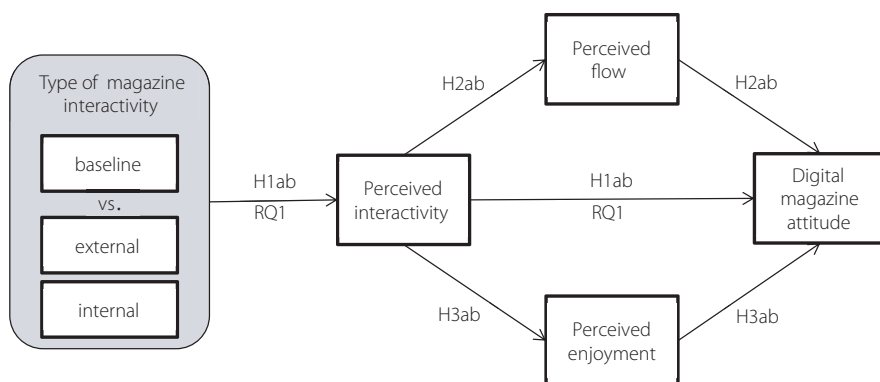


Figure 1. *The study's hypotheses and research question visualized*

Note. The independent variable "magazine interactivity" has three categories: 1) baseline, 2) external, and 3) internal. All the analyses will be performed with "baseline" as the reference category. The hypothesized mediations will thus be tested for "baseline vs. external", and for "baseline vs. internal".

THEORETICAL BACKGROUND

The mediating role of perceived interactivity

The difference between objective and perceived interactivity

Interactivity can be defined as "the technological attributes of mediated environments that enable [...] interaction[s] between communication technology and users, or between users through technology" (Bucy & Tao, 2007, p. 647). When examining its effects, it is necessary to make a distinction between "objective interactivity" (also known as actual interactivity) and "perceived interactivity" (Voorveld et al., 2011; Yang & Shen, 2018). Objective interactivity can be determined by a simple *headcount* of all the interactive features that are placed within, for instance, a digital magazine, whereas perceived interactivity reflects consumers' *perceptions* about the level of interactivity (Voorveld et al., 2011; Wu, 2005).

The necessity to treat objective and perceived interactivity as separate constructs is central for three reasons: First, adding more interactive features does not necessarily guarantee that users perceive the mediated environment as more interactive (Lee, et al., 2004; Song & Bucy, 2008). Second, perceived interactivity effects outweigh the effects of objective interactivity (Yang & Shen, 2018); and third, scholars have demonstrated that perceived interactivity mediates the relationship between objective interactivity and its outcomes (Song & Bucy, 2008; Wu, 2005). In the following, the mediating role of perceived interactivity will be described in the context of external and internal communication features placed in a digital magazine.

The influence of external and internal communication features on digital magazine attitude through perceived interactivity

An earlier study has revealed that digital magazines with either external or internal communication features are perceived as more interactive than those without these features (Rauwers, et al., 2016). Research has shown that these higher levels of perceived interactivity could result into more positive attitudinal responses (Tan, Brown, & Pope, 2019; Van Noort, et al., 2012), as perceived interactivity functions as a mediator in the relationship between objective interactivity and consumers' attitudinal responses (Song & Bucy, 2007; Wu, 2005). Therefore, in line with these findings, we hypothesize that both external and internal communication features have the ability to increase consumers' interactivity perceptions, and that this subsequently translates into more positive attitudinal responses towards the digital magazine:

- H1:** The presence of (a) external or (b) internal communication features evokes feelings of perceived interactivity, which subsequently generates a more positive digital magazine attitude.

Besides, little is known whether these effects on and through perceived interactivity, differ in strength per type of interactive feature (external vs. internal). For instance, it can be argued that external communication features could elicit less strong interactivity perceptions than internal communication features, since all the social interactions take place on external platforms, like Facebook. Consequently, users could ascribe the elicited interactivity perceptions to the external platforms instead of the digital magazine. To get a better understanding of the mediating role of perceived interactivity, the following research question is therefore posed:

- RQ1:** To what extent do the effects of external and internal communication features on consumers' magazine attitude through perceived interactivity differ in strength?

The mediating role of perceived interactivity explained

In this study, two processes are identified that could potentially explain the mediating effects of perceived interactivity on consumers' attitudinal responses: 1) flow experience, and 2) perceived enjoyment. In the following, both paths will be described.

Flow experience as underlying mechanism

Feelings of flow can be experienced when digital media users are so immersed in an online interactivity that little attention is left for anything else (Czikszentmihalyia, 1975; Hoffmann & Novak, 1996). This state of mind can be elicited when consumers experience sensations of control, attention, curiosity, and feelings of interest towards the activity in question (Huang, 2006; Trevino & Webster, 1992; Webster, Trevino, & Ryan, 1993).

In the context of digital magazines, we expect that external and internal communication features can elicit the above-mentioned sensations as long as consumers are at least aware of the presence of these features inside the digital magazine (i.e., increasing consumers' interactivity perceptions). First, both types of human interactive features can elicit a sense of *control* since they enable magazine readers to create own content (e.g., by writing comments). Second, people's *attention* can be aroused as the human interactive features enable them to communicate with other like-minded people² (Hull & Lewis, 2014). Third, human interactivity generates a constant flow of feedback (e.g., readers can reply on previous comments), which keeps magazine readers' *curiosity* awake. Fourth, due to magazine readers' like-mindedness, readers are likely to be *interested* in sharing their thoughts about common interests with other readers.

Extrapolating from the above, we see that if consumers evaluate the magazine as more interactive by being aware of the implemented human interactive features, the presence of these features can bring consumers into a state of flow. Further, research has revealed that when people get into this flow state, this has a positive influence on their attitudinal responses (Van Noort, et al., 2012; Vermeir, Kazakova, Tessitore, Cauberghe, & Slabbinck, 2014). Since we believe that digital magazines with external or internal communication features are evaluated as more interactive (H1), we therefore hypothesize that this will subsequently evoke feelings of flow, which ultimately improves consumers' digital magazine attitude (see Figure 1):

- H2:** The presence of (a) external or (b) internal communication features evokes feelings of perceived interactivity, which subsequently generates feelings of flow, and ultimately a more positive digital magazine attitude.

² Members of a magazine audience can be seen as like-minded as they share specific characteristics (e.g., age and gender) and interests (e.g., sports, fashion, cars; Consterdine, 2014)

Perceived enjoyment as underlying mechanism

A second underlying mechanism that could explain why perceived interactivity improves consumers' attitudinal responses is perceived enjoyment. This positive emotion is elicited when people experience an activity to be enjoyable in its own right without taking its outcomes in mind (Davis, et al., 1992). More specifically, in the case of digital content, research has shown that online activities (e.g., reading a digital magazine) are perceived as more enjoyable when the content is evaluated as highly interactive (Cyr, et al., 2009; Yang & Shen, 2018). Perceived interactivity can therefore be seen as an important predictor of task enjoyment.

Several studies have demonstrated that there is a strong, positive relation between perceived enjoyment and various evaluative outcomes, like brand attitude (Segijn, Voorveld, & Smit, 2016) and website attitude (Childers, Carr, Peck, & Carson, 2001). However, the exact influence of perceived interactivity on these outcomes through perceived enjoyment has, to our knowledge, never been examined. Therefore, to test complete mediation effects, the following hypothesis is formulated (see Figure 1):

- H3:** The presence of (a) external or (b) internal communication features evokes feelings of perceived interactivity, which subsequently generates feelings of enjoyment, and ultimately a more positive digital magazine attitude.

METHODS

Experimental design

To test the study's hypotheses and research question, a field experiment was conducted with a one-factor (i.e., type of magazine interactivity) between-subjects design. There were three experimental conditions: 1) a condition with external communication features (i.e., external condition), 2) a condition with internal communication features (i.e., internal condition), and 3) one without human interactive features (i.e., baseline condition). The study was part of a larger project wherein participants used a digital magazine app for eight weeks at home on their own tablet. After three weeks, participants received an email with a survey to collect the data for this study.

Participants recruitment and sample size

Participants were recruited by Sanoma (one of the largest magazine companies in Europe) through social media and email. The cover story stated that Sanoma had developed a new Android magazine app, *The Digital Flair App*, and that they were looking for volunteers (18 years or older) who were willing to test the Beta-version of it. In exchange, volunteers could freely use the magazine app for eight weeks, and they would receive an access code for two

additional digital magazines upon completion of a questionnaire. With this approach, more than 40,000 magazine consumers were reached. In total, 456 magazine consumers were willing to participate in our study, and were randomly assigned to our experimental groups. However, due to dropouts ($n = 259$; see 'Non-Response, Dropouts, and Randomization Checks'), the final research sample consisted of 197 participants (97.5% female³; $M_{\text{age}} = 40.42$, $SD = 10.46$): 62 in the external condition, 66 in the internal condition, and 69 in the baseline condition.

Stimulus materials

Digital Flair App

For the purpose of this study, a magazine app was created called *The Digital Flair App*. Within this app, participants could read authentic issues of the Dutch *Flair*, which is a weekly magazine targeted at women between 25 and 45 years of age and is published by Sanoma. When participants logged onto the magazine app for the first time, they saw a tutorial that explained which interactive features were present in the digital magazine, and how they worked. After closing the tutorial, a digital "bookcase" popped up filled with *Flair* issues. By clicking on an issue, the content opened full screen and participants could start to read. Every week a new *Flair* issue was added to the bookcase, which was released on the same date that it also became available in real online stores. With this strategy participants were given the most optimal illusion that *The Digital Flair App* was a real magazine app that belonged to the magazine publisher Sanoma.

We decided to create our own magazine app, instead of using the already existing *Flair* app, as 1) this gave us the opportunity to install in-app analytic software inside the app, and 2) it enabled us to manipulate type of magazine interactivity to create our three experimental conditions.

In-app analytics

The installed in-app analytics were data trackers that traced down the user activities that were performed inside the magazine app. More specifically, they registered 1) which user had executed the activity, 2) the type of activity, 3) along with the date and time that this activity was performed. For instance, a registered user activity could appear as follows: ['USER9', 'OPENED_MAGAZINE', 'Flair1', '2016-04-04 10:08:20'], showing you the user that performed the activity (USER9), the activity itself (opened magazine Flair1), and the date and time on which the activity was executed (on April 4, 2016 at 10:08:20). All these data were automatically stored in an online database. The inclusion of these in-app analytics was an important prerequisite of our field experiment, as this enabled us to "see" what people actually did inside the magazine app, without being physically there.

³ See 'Stimulus Materials'.

Manipulating type of magazine interactivity

When participants had opened a *Flair* issue, the content of the magazine was automatically loaded in a "baseline interactive layout". This baseline interactive layout consisted of the following non-human interactive features: zoom-function, hyperlinks, navigation bar, and page orientation function (i.e., reading the magazine in either landscape or portrait). These features are commonly used in current digital magazines, as they increase the readability of the magazine content, but they do not facilitate any form of social interactions. This baseline interactive layout was present in all the three experimental groups of this study. Further, the presence of human interactive features was manipulated across conditions by the addition/omission of external and internal communication features. This resulted in the following three conditions:

The baseline condition

No human interactive features were implemented in this condition (see Figure 2).

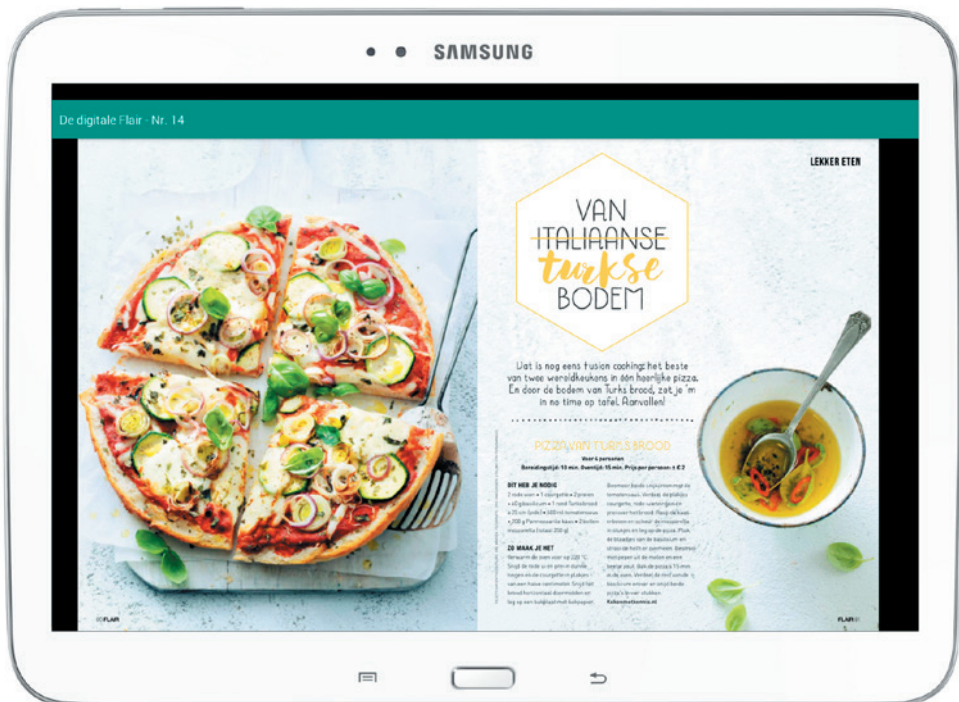


Figure 2. The baseline condition.

The external condition

The following cluster of external communication features was implemented in this condition: a Mail button, a Share button, and a Facebook button (see Figure 3). The Mail button enabled participants to directly contact the (fictive) magazine editorial board by email. By clicking on the button, the default email client opened, and a new email was crafted with the recipient email address (of the editorial board) filled in. The Share button allowed participants to share separate magazine articles with others via Facebook, Twitter, or by mail. The button included a live counter that displayed the amount of times an article had already been shared. The Facebook button enabled participants to take part in magazine content related discussions on the magazine's (fictive) Facebook page. In addition, to let participants fully experience the functionality of the external communication features, we raised the scores of several article Share buttons (i.e., pretending that some magazine articles had already been shared a couple of times), and we created some fictive comments on the magazine's Facebook page.

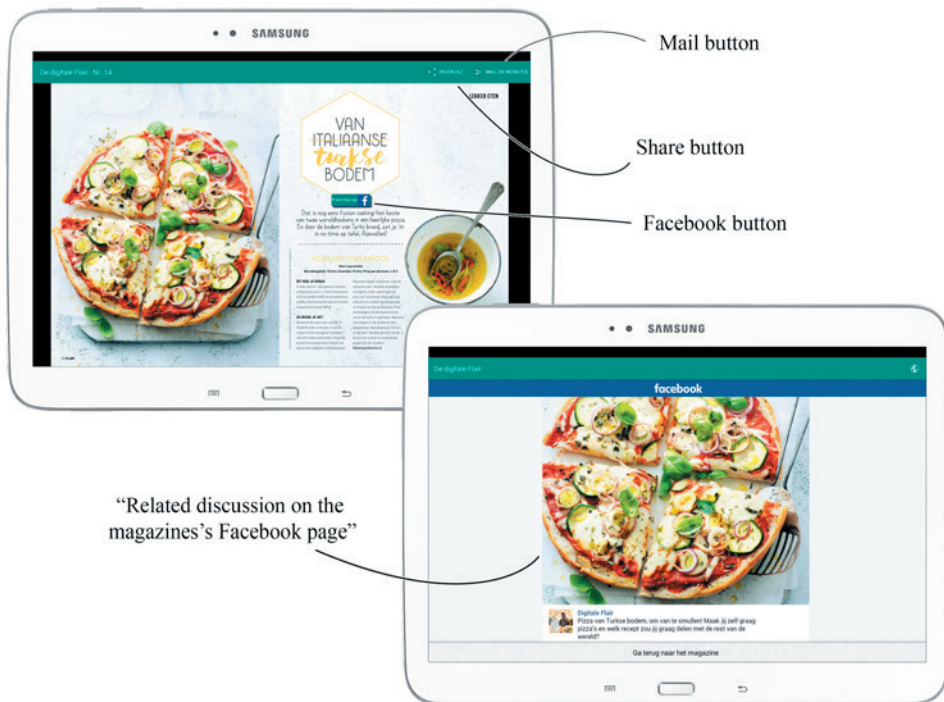


Figure 3. *The external condition.*

Internal condition

The following cluster of internal communication features was implemented in this condition: a Poll button, a Comment button, and a Like/Dislike button (see Figure 4). The Poll button was attached to four articles in each *Flair* issue. Once participants opened an article with a Poll button, a small pop-up window appeared in the bottom right-hand corner of the screen, which could be easily clicked away or it disappeared after three seconds. In this window, a question was posed related to the magazine article combined with several answer possibilities. After answering the poll, participants were able to see how other people had voted, and from then, the poll no longer automatically appeared. The Comment button enabled participants to discuss the content of a specific magazine article with other readers. If participants clicked on the button, a *Comment Window* appeared. Within this window, participants could read the comments of other users, reply on them, or write their own commentaries. The button included a live counter that displayed the amount of comments that were placed within the *Comment Window*. Within the *Comment Window*, the Like/Dislike button enabled participants to either “like” or “dislike” a user’s comment, and it displayed the number of “likes” and “dislikes” the comment had already generated.

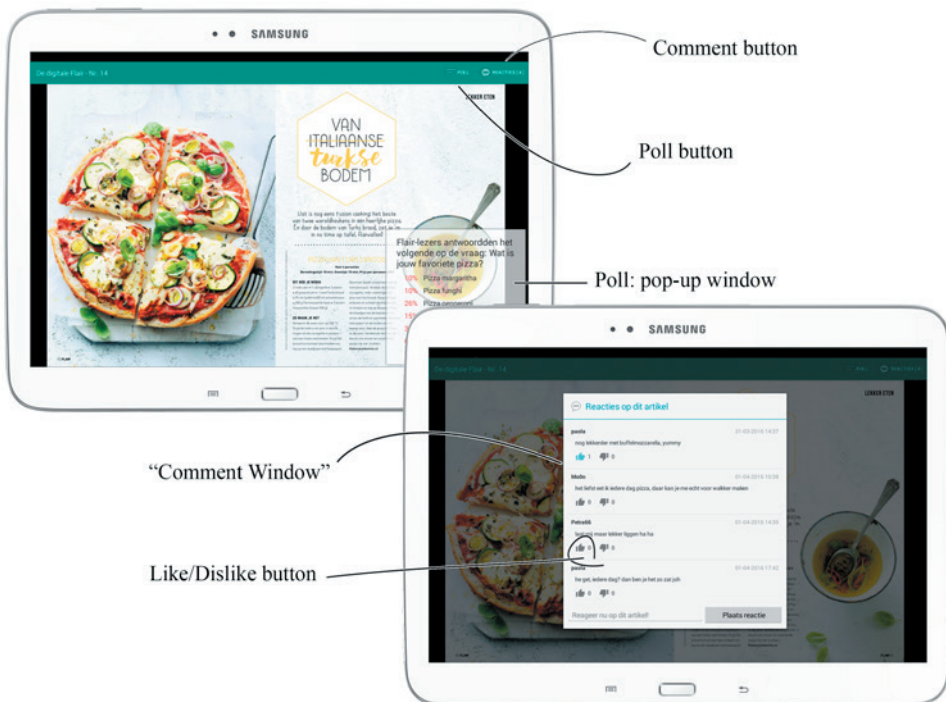


Figure 4. The internal condition.

In addition, to give participants the most full experience with *The Digital Flair App*, some internal communication interactions were made up by the researchers. More specifically, for several magazine articles, comments of fictional magazine readers were placed within the *Comment Window* combined with fake likes/dislike, and we had also already “answered” the Poll question a couple of times before participants were exposed to it.

Procedure

People who wanted to participate in our study provided an informed consent, and filled in a short survey wherein the study’s control variables and participants’ demographics were measured. Next, on the same day, all participants received an email with detailed instructions and a link to *The Digital Flair App*. Participants were asked to install the magazine app on their tablet, and to use the app regularly during the following eight weeks. They were also informed that after three weeks they would receive a survey with questions about their experiences with the magazine. Further, if they did encounter any problems, they could contact the researcher for additional help.

To make it more likely that participants remained involved during the experiment, every week an email was sent by Sanoma when a new issue of *Flair* had been released inside the magazine app. After the third week, participants received an email with a link to the questionnaire. Questions were displayed in the following order: perceived interactivity, perceived enjoyment, perceived flow, and digital magazine attitude. Participants who did not complete the questionnaire after four days received a reminder, and after seven days the questionnaire was closed. The procedure of this study was approved by the Ethical Committee of the University of Amsterdam.

Measures

Digital magazine attitude

Digital magazine attitude was measured with 6 items on a 7-point semantic differential scale. The bipolar ends were *not useful/useful*, *not valuable/valuable*, *not interesting/interesting*, *terrible/nice*, *not entertaining/entertaining*, and *unpleasant/pleasant* (Crites, Fabrigar, & Petty, 1994; Keer, Van den Putte, & Neijens, 2010; $\alpha = .93$; $M = 5.52$, $SD = 0.91$).

Perceived interactivity

Perceived interactivity was measured with four items on a 7-point Likert scale (1 = *strongly disagree*, 7 = *strongly agree*) that completed the statement “When I was reading the digital Flair ...” The items were: “there was an opportunity to talk with others about the magazine within the app”; “I was able to communicate with others within the app”; “I got the feeling that the digital magazine wanted to stimulate social interaction”; and “I experienced the digital magazine as interactive” (Liu, 2003; McMillan & Hwang, 2002; $\alpha = .90$; $M = 4.08$, $SD = 1.53$).

Flow experience

Flow experience was measured with four items on a 7-point Likert scale (1 = *strongly disagree*, 7 = *strongly agree*) that completed the statement "When I was reading the digital Flair ... "The items were: "I felt totally captivated", "time seemed to pass very quickly", "I just forgot everything around me", and "I was totally focused on the magazine" (Barzilai & Blau, 2014; Novak, Hoffmann, & Duhachek, 2003; $\alpha = .93$; $M = 4.42$, $SD = 1.37$).

Perceived enjoyment

Perceived enjoyment was measured with five items on a 7-point Likert scale (1 = *strongly disagree*, 7 = *strongly agree*) that completed the statement "I would describe my experience with the digital Flair as ... "The items were: "interesting", "a boring activity" (rev), "amusing", "a waste of time" (rev), and "enjoyable" (Tauer & Harackiewicz, 1999; $\alpha = .89$; $M = 5.49$, $SD = 0.92$).

Control variables, in-app analytics, and randomization checks

A number of control variables were tested, to check whether the effects of our independent variable were not caused by other differences between our experimental conditions. More specifically, app installment and app usage were measured with our in-app analytics, whereas power usage, previous *Flair* reading behavior, and demographics were tested with our survey.

To analyze the large amount of data collected by our in-app analytics, several Python scripts were written. App installment was determined by whether or not a participant had opened *The Digital Flair App* (0 = no, 1 = yes, % that had installed the app: 54.6). App usage reflected the time in seconds that a participant had spent using *The Digital Flair App* ($M = 4255.31$, $SD = 4072.87$).

Next, with our survey, power usage – "a user's motivation, efficacy, expertise, and demonstration of evolved technology" (p. 305; Marathe, Sundar, Bijvank, Van Vught, & Veldhuis, 2007) – was measured with seven items on a 7-point Likert scale (1 = *strongly disagree*, 7 = *strongly agree*). The scale included items such as: "I like to try out the different functions of digital devices" and "I find it easy to use digital devices" (Marathe, et al., 2007; $\alpha = .85$; $M = 5.43$, $SD = 1.33$). Previous *Flair* reading behavior was measured on a 5-point scale by posing the question "How often do you read the Flair? (print or digital)", which was adapted from Lee, Hornik, and Hennessy (2008). Answer categories were: (1) never, (2) once a year, (3) once or twice a month, (4) at least once a week, or (5) (nearly) daily ($M = 2.68$; $SD = 1.06$). Next, participant's age, gender, and educational attainment were measured.

RESULTS

Dropouts and randomization checks

The in-app analytics revealed that from the people who were willing to participate in our study ($N = 456$), 207 participants had not installed *The Digital Flair App* on their tablet. Another 38 participants dropped out, as they had not filled in the study's questionnaire. Of the remaining 211 participants, 14 had to be excluded from further analyses as our in-app analytics revealed that they had not used the app for at least five⁴ minutes. So, in total, there were 259 dropouts, leaving a final sample of 197 participants.

To check whether these dropouts affected the randomization of our experimental groups, ANOVA and chi-square analyses were performed. The results revealed that the remaining participants in the experimental groups ($n = 197$) did not differ with respect to age, $F(2, 194) = 1.17, p = .313$, gender, $\chi^2(2) = 4.86, p = .088$, education attainment, $F(2, 198) = 0.24, p = .783$; power usage, $F(2, 194) = 0.56, p = .575$; or previous *Flair* reading behavior, $F(2, 194) = 0.40, p = .680$. Randomization was therefore considered successful.

The mediating role of perceived interactivity

To test whether the presence of external (H1a) or internal (H1b) communication features positively affected consumers' digital magazine attitude through perceived interactivity, mediation analyses were performed using Hayes' (2012) PROCESS macro Model 4. To examine the differences between our three manipulated digital magazine types (baseline vs. external vs. internal), we created dummy variables for each type. Subsequently, three separate mediation analyses were conducted with one of the magazine types as the independent variable, one of the other types as the covariate, and perceived interactivity as the mediator. The excluded type in the analysis functioned as the reference category (see Table 1).

Mediation effects through perceived interactivity

The results of PROCESS revealed that, compared to the baseline, the presence of external communication features had a positive indirect effect on consumers' digital magazine attitude through perceived interactivity. Also, an identical effect was found for the presence of internal communication features. Hence, both external and internal communication features elicited increased feelings of perceived interactivity, which subsequently had a positive influence on consumers' digital magazine attitude. These findings were in support of Hypotheses 1a and 1b.

⁴ A short pretest revealed that participants had to spend at least 5 minutes in the magazine app to read the magazine tutorial and to get a sufficient impression of the magazine.

External vs. internal: Comparing the strength of the indirect effects

To answer Research Question 1, we compared the strength of the found indirect effects of external and internal communication features on digital magazine attitude through perceived interactivity. PROCESS showed that the indirect effect of the internal communication features was significantly stronger than the one via the external communication features (see Table 1). This means that the internal communication features have the largest impact on consumers' digital magazine attitude via perceived interactivity.

To further explore this difference in effect strength, an ANOVA (with Bonferroni-test) was conducted with type of magazine interactivity as the independent variable, and perceived interactivity as the dependent variable. Results revealed that the magazine with the internal communication features was perceived the most interactive ($M = 4.95$, $SD = 1.05$), followed by the one with the external communication features ($M = 4.44$, $SD = 1.30$; $p = .068$), and as last, the one without communication features ($M = 2.89$, $SD = 1.40$; $p < .001$), $F(2, 194) = 48.72$, $p < .001$. Hence, both feature types make consumers evaluate the magazine as more interactive. However, since this effect is marginally stronger for internal than for external communication features, this could indicate why the indirect effects through perceived interactivity are more pronounced for internal than for external communication features.

Table 1. Indirect effects of type of magazine interactivity on magazine attitude through perceived interactivity

Type of magazine interactivity	Indirect effect	Direct effects	
	<i>b</i> (<i>SE</i>)	Magazine interactivity on perceived interactivity <i>b</i> (<i>SE</i>)	Perceived interactivity on magazine attitude <i>b</i> (<i>SE</i>)
External (baseline) ^a	.20(.08) [.066; .383] ^b	1.54(.22)***	.13(.05)**
Internal (baseline) ^a	.27(.11) [.080; .502] ^b	2.05(.22)***	...
External (internal) ^a	-.07(.04) [-.168; -.013] ^b	-.51(.22)*	...

Note. ^a = reference category; ^b = 95% BCBCI; ... = the same scores as above. * = $p < .05$, ** = $p < .01$, *** = $p < .001$.

The mediating role of perceived interactivity explained

To explain the underlying mechanisms through which perceived interactivity mediates interactivity effects on attitudinal responses, flow experience (H2) and perceived enjoyment (H3) were tested for their explanatory power. Hayes' (2012) PROCESS macro Model 6 was used to test our proposed serial mediations.

Serial mediation through flow experience

In Hypothesis 2 we proposed that the presence of either (a) external or (b) internal communication features would elicit feelings of interactivity, which subsequently leads to a stronger flow experience, and ultimately to a more positive digital magazine attitude. To test this assumption, we ran three separate serial mediation analyses comparing the three types of magazine interactivity. In these analyses, perceived interactivity functioned as the first mediator, flow experience as the second mediator, and digital magazine attitude as the dependent variable.

PROCESS revealed a positive indirect effect for both external and internal communication features on digital magazine attitude through perceived interactivity and flow experience (see Table 2). More specifically, compared to the baseline, the presence of external or internal communication features resulted in stronger interactivity perceptions, which subsequently enhanced feelings of flow, and this ultimately generated a more positive digital magazine attitude. Hypotheses 2a and 2b were thus supported.

Table 2. Indirect effects through flow experience

Type of magazine interactivity	Indirect effect		Direct effects	
	<i>b</i> (<i>SE</i>)	Magazine interactivity on perceived interactivity	Perceived interactivity on flow experience	Perceived enjoyment on magazine attitude
External (baseline) ^a	.12(.06) [.016; .254] ^b	1.54(.22)***	.19(.08)*	.40(.04)***
Internal (baseline) ^a	.16(.08) [.020; .313] ^b	2.05(.22)***
External (internal) ^a	-.04(.03) [-.121; -.003] ^b	-.51(.22)*

Note. ^a = reference category; ^b = 95% BCBCI; ... = the same scores as above. * = $p < .05$, *** = $p < .001$.

Serial mediation through perceived enjoyment

In Hypothesis 3 we suggested that the presence of either (a) external or (b) internal communication features would elicit feelings of interactivity, which subsequently leads to stronger feelings of enjoyment, and ultimately to a more positive digital magazine attitude. To test this, we ran three separate serial mediation analyses comparing the three types of magazine interactivity. In these analyses, perceived interactivity functioned as the first mediator, perceived enjoyment as the second mediator, and digital magazine attitude as the dependent variable.

PROCESS demonstrated a positive indirect effect for both external and internal communication features on digital magazine attitude through perceived interactivity and perceived enjoyment (see Table 3). More specifically, compared to the baseline, the presence of external or internal communication features resulted in stronger interactivity perceptions, which subsequently increased perceptions of enjoyment, and this ultimately resulted into a more positive digital magazine attitude. So, Hypotheses 3a and 3b were supported.

Table 3. Indirect effects though perceived enjoyment

Type of magazine interactivity	Indirect effect		Direct effects	
	<i>b</i> (<i>SE</i>)	Magazine interactivity on perceived interactivity <i>b</i> (<i>SE</i>)	Perceived interactivity on perceived enjoyment <i>b</i> (<i>SE</i>)	Perceived enjoyment on magazine attitude <i>b</i> (<i>SE</i>)
External (baseline) ^a	.11(.06) [.006; .240] ^b	1.54(.22)***	.11(.05)*	.60(.05)***
Internal (baseline) ^a	.14(.07) [.008; .316] ^b	2.05(.22)***
External (internal) ^a	-.04(.03) [-.116; -.002] ^b	-.51(.22)*

Note. ^a = reference category; ^b = 95% BCBCI; ... = the same scores as above. * = $p < .05$, *** = $p < .001$.

CONCLUSION AND DISCUSSION

In a field experiment, we examined the mediating role of perceived interactivity in the relationship between objective interactivity (i.e., adding external or internal communication features to a digital magazine) and consumers' attitudinal responses (i.e., digital magazine attitude). The first aim of this field experiment was to examine *why* higher levels of perceived interactivity could improve consumers' attitudinal responses, by testing the explanatory power of two potential underlying mechanisms: flow experience and perceived enjoyment. Serial mediation analyses demonstrated that adding human interactive features to a digital magazine made consumers evaluate the magazine as more interactive (i.e., increasing perceived interactivity), which subsequently elicited higher levels of flow and enjoyment, which, ultimately, improved consumers' attitudes towards the digital magazine. Hence, both flow experience and perceived enjoyment underlie the effects of perceived interactivity on consumers' attitudinal responses.

The second aim of this study was to investigate whether the perceived interactivity effects differ in strength per type of interactive feature (i.e., external vs. internal communication features). Results revealed that both external and internal communication features increased consumers' interactivity perceptions, but that this effect was substantially stronger for the internal communication features. Consequently, due to this difference in effect strength, internal (vs. external) communication features were also able to elicit stronger indirect effects through perceived interactivity on consumers' digital magazine attitude. So, this implies that both interactive feature types are of value to increase consumers' interactivity perceptions and to improve their attitudinal responses, but that these effects are the strongest for internal communication features.

Theoretical implications

With this study, several important contributions are made to the existing literature regarding interactivity effects. To start with, the findings of this study contribute to the creation of a theoretical model to gain a better understanding of *why* higher levels of perceived interactivity generate more positive attitudinal responses. This knowledge is valuable, as previous research has already shown that perceived interactivity improves consumers' attitudinal responses (Sundar & Kim, 2005; Wu, 2005), but theoretical explanations for these effects were missing. In this study, two explaining mechanisms have been identified: flow experience and perceived enjoyment. The study's results revealed that both mechanisms underlie the effects of perceived interactivity on consumers' attitudinal responses. So, placing interactive features into a digital magazine makes people evaluate the magazine as more interactive, which then translates into higher levels of flow and enjoyment, which ultimately elicits more positive attitudes towards the magazine.

Second, this study also delivers important insights to the stream of literature aiming to disentangle *which* interactive features are able to increase consumers' interactivity perceptions (e.g., Voorveld, et al., 2011), by examining this for both external and internal communication features. The study's findings revealed that both types of interactive features increased consumers' interactivity perceptions, but that this effect was substantially stronger for internal communication features. Consequently, this implies that although the interactive goal of the interactive features is identical (i.e., facilitating social interactions between magazine readers), this does not automatically mean that these features also generate identical effects. This finding could be explained by the fact that external and internal communication features facilitate social interactions on different locations. In the case of external communication features, all social interactions happen on external platforms, like Facebook; whereas in the case of internal communication features, all communication takes place within the digital magazine itself. Consequently, this suggests that the location of the social interactivity could play a crucial role in determining the

strength of the perceived interactivity effects. For instance, it could be argued that in the case of the external communication features, not all the elicited interactivity perceptions will be linked to the digital magazine, as a part of the interactivity could also be ascribed to the external platforms (e.g., Facebook). To draw stronger conclusions, further comparative research between external and internal communication features is required.

Third, this study proved the robustness of the findings of Rauwers et al. (2016), by showing that the previously found positive effects of external and internal communication features on perceived interactivity do not only apply for students in a lab experiment, but also for a general magazine audience using a real-life setting. Moreover, this study extends previous findings, by being the first to reveal that external and internal communication features elicit differential effects *on* and *through* perceived interactivity, which subsequently results in (less) stronger effects on consumers' attitudinal responses. With this knowledge, substantive evidence is delivered for the claim that human interactive features need to be subdivided into external and internal communication features (Rauwers, et al., 2016), as both feature types generate differential persuasive outcomes.

Context of the study and future research

In this study, the developed theoretical model for perceived interactivity effects has only been tested for human interactive features. However, besides human interactive features, there is also another type of features that can be implemented in digital content, namely medium interactive features (Chung, 2008; Stromer-Galley, 2000). Medium interactive features facilitate interactions between user and device by giving users, to a certain degree, the control over the presentation of the digital content (e.g., via photo galleries or movie clips) or the content flow (e.g., via hyperlinks). Consequently, this raises the question whether the found theoretical model in this study is also applicable to these features. Future research is needed on this topic.

Further, another field of research that needs more examination is whether and how interactivity effects persist over time. More specifically, it has been argued that consumers who have become too familiar with the interactive features, will no longer perceive the features as interactive – or to a lesser extent, which will subsequently result in a decrease of perceived interactivity effects (Voorveld, et al., 2011). In an attempt to rule out this potential novelty effect, participants of this study were given three weeks to first get familiar with *The Digital Flair App* and its interactive features, before they had to fill in the study's questionnaire. However, more research is needed to examine the power and duration of the perceived interactivity effects over time.

Practical implications

The outcomes of this study provide publishers of online content several interesting insights. First, this study shows that adding human interactive features (i.e., external and internal communication features) to digital content positively affects consumers' reading experiences. The reason is that the presence of these interactive features makes consumers evaluate the content as more interactive, which subsequently evokes an increased state of flow and feelings of enjoyment.

Furthermore, this study also demonstrates that both external and internal communication features improve consumers' attitudinal responses towards the digital content, but that the effect strength differs per type of interactive feature. More specifically, internal communication features have a substantial stronger impact on consumers' attitudinal responses via perceived interactivity, than when external communication features are used. Hence, both feature types are of value to implement in digital content, but when a choice needs to be made, internal has to be preferred over external as these features elicit the strongest persuasive effects.

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