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How Interactive Storytelling Persuades: The Mediating Role of Website Contingency and Narrative Transportation

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ABSTRACT

While digital media technology has applied the "choose-your-own-adventure" type of storytelling to many different contexts, a rigorous empirical examination of the persuasive effect of interactive storytelling has only recently begun. Filling this gap, the current study investigates how interactive features added to a health-themed story addressing the obesity epidemic in the U.S. enhance the story's persuasive effectiveness. Findings from an online experiment (N = 134) showed that the interactive story enhanced perceived contingency, which led to greater narrative transportation to the story. Greater transportation resulted in more story-consistent beliefs and higher intention to revisit the website.

Introduction

Narrative content in new media platforms is no longer an experience solely curated by its creator. The audience now holds greater autonomy over how they consume such fare, for instance, interactive storytelling provides users with two-way, reciprocal communication with the story by allowing them to control its narrative flow. The most representative example of interactive storytelling can be found in the "choose- your-own-adventure" type of stories. This format calls for active participation of the audience by asking them to choose the next step for the story characters (Green & Jenkins, 2014). Recent applications of interactive storytelling are widely available on news websites and educational websites. For instance,

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audiences can choose how they can rebuild Haiti after an earthquake by making decisions on a variety of social problems (http://apps.rue89.com/haiti/en/). Each path chosen by users displays a different consequence that educates them about the complex nature of reconstructing a city after a natural disaster.

Whereas the impact of interactive storytelling on entertainment has been highlighted by researchers, its persuasive effect on health communication has not been thoroughly examined, except for a few recent studies (e.g., Christy, 2016). In particular, the nature of media platforms that enables the interactive user experience has been largely neglected by previous studies. In human-website interaction, as users choose their own paths navigating the website content, the reciprocal communication between the audience and the website may resemble continuous back-and-forth conversation between two human agents (Sundar et al., 2016). Interactive features that allow this type of threaded interaction between the website and the user have been defined as *message interactivity* (Sundar et al., 2015).

In this regard, the current study attempts to understand whether adding interactive features to a health-themed narrative can enhance its persuasive effectiveness. We are interested in the effect of interactive storytelling from both theoretical and practical perspectives. First, whereas prior studies identified several key mediators that explain user engagement with interactive narratives–such as greater identification (Jenkins, 2014), perceived responsibility (Jenkins, 2014), and enjoyment (Parrott et al., 2017)–it is still not clear whether these psychological outcomes are explained by the nature of interactive media interface or pertained to the narrative content per se. In other words, it is inconclusive whether interactivity in storytelling has an additional persuasive effect. Through a controlled experiment, this is the primary theoretical question we intend to answer. Second, the study is also interested in the practical applications of interactive storytelling and aims to propose a better practice of designing interactive narratives for content creators and health website designers.

In short, the current study combines literature on narrative transportation (Braddock & Dillard, 2016; Green, 2006; Green & Brock, 2000) with HCI (human-computer interaction) research (Bellur & Sundar, 2017; Sundar et al., 2015) and examines what aspects of user experience in interactive media can enhance a health-themed story's persuasiveness. Specifically, the current study defines interactive storytelling as a message-interactivity feature that allows readers to choose an obese character's upcoming actions in the story and examines how message interactivity in the interactive narrative leads to greater story-consistent beliefs related to obesity issues.

Literature Review

The Effect of Interactive Storytelling on Perceived Contingency and User Control

Interactivity enables two-way communication between users and media platforms. Users not only receive messages from media but also control the interface, receiving the output of their previous input. The extent of this reciprocal message exchange has been defined as interactivity-as-process (Stromer-Galley, 2000) or communication contingency (Rafaeli, 1988; Sundar, 2007). Extending this view, recent literature in human-computer interaction (HCI) defines website contingency as the degree to which interactive media is perceived to address the user's previous input (Sundar et al., 2015). Website contingency has been deemed one of the key dimensions of perceived interactivity (Yang & Shen, 2018). Synthesizing prior literature, Sundar et al. (2015) proposed that one of the main psychological outcomes of using interactive media is an increase in perceived contingency, which includes the heightened perceptions of dialogue, reciprocity, and threadedness of communication between the user and the interactive platform. Especially, TIME (a theory of interactive media effects; Sundar et al., 2015) proposes that when interactive media affords higher contingency, users are able to have more reciprocal communication with the website, which leads to greater user engagement with the website's content.

From the perspective of this contingency view of interactivity, interactive storytelling can be another example of message interactivity, given that a story is constructed from a series of exchanges that are contingent upon what the user has previously chosen. The "choose-your-own-adventure" type of storytelling enables the user to take action in deciding the next phase of the story, and it unfolds the story as requested. Naturally, this process can imbue users with a higher perception of contingency, upon which the website's response heavily relies for their input. In fact, a recent study (Christy, 2016) empirically demonstrated that users experienced greater perceived contingency when they chose their own paths in an interactive narrative.

The choose-your-own-adventure type of storytelling would afford the highest level of perceived contingency, since users can determine the fate of the characters as they navigate the story. Prior research in HCI, however, has shown that even simpler features – reminding users that the website takes into account their previous choices–could imbue a sense of contingency into users. For instance, Bellur and Sundar (2017) have examined the psychological impact of reciprocal communication with a chatbot that simply refers back to what the user chose as an answer to previous health-related questions. Other studies have displayed users' browsing history as a manipulation of message interactivity (Oh & Sundar, 2015; Sundar et al., 2014). Even though these manipulations did not provide complete control for users to

modify website content as they navigate it, such work commonly reported that these features successfully enhanced perceptions of website contingency, which led to greater feelings of engagement while browsing the websites.

Adopting this approach, the current study defines interactive storytelling as a type of user interface that (a) enables users to explore the multiple paths that characters can take, as opposed to determining a single path and (b) provides relevant narrative content for each path explored. With this definition, we first hypothesize:

H1: Interactive storytelling will enhance perceived contingency of the website.

Perceived contingency is not the only outcome of user experience with interactive narratives. Green and Jenkins (2014) have proposed a conceptual model of interactivity effects in the context of interactive narratives. In their model, user control is one of the main psychological processes that occur when users choose their own paths in interactive narratives, which leads to greater narrative engagement such as transportation, identification, and realism. Dillman Carpentier et al. (2015) also pointed out that user agency is the key feature of interactive narratives that predicts greater user-character connection. In addition, literature in HCI also supports this point of view. According to Sundar et al. (2015), the adoption of interactive features allows users to hold greater control over their navigating experience on a website. Perceived fluidity of interacting with these features then enables users to ascertain their degree of control over their interaction experience (Lin, 2004).

Even with simple message interactive features such as interactive history or chatbots that confirm their previous choices, for instance, the audience may perceive bilateral communication with the interface and feel greater control over how the website functions. Thus, we also examine the following hypothesis:

H2: Interactive storytelling will enhance perceived user control of their interaction with the website.

The Effect of Interactive Storytelling on Transportation and Persuasion

When processing narratives, individuals are known to have a common experience called transportation, during which they feel immersed and lost in the narrative world. According to the transportation-imagery model (Green & Brock, 2000), transportation consists of three components: cognitive attention, mental imagery, and emotional involvement. When a reader's cognitive attention is centered on the narrative world (*cognitive attention*),

the reader is likely to be transported to the story. In addition, transportation occurs when the reader creates the vivid mental image of the story characters (*mental imagery*) and is emotionally affected by the story (*emotional involvement*). As a result, the more that a reader is transported to the story, the more strongly the beliefs portrayed in the story influence the reader's belief structure. A number of studies have supported the positive and significant association between narrative transportation while reading a story and the successful development of story-consistent beliefs (e.g., Cohen et al., 2015; Escalas, 2006; Green, 2004; Green & Brock, 2000).

In particular, interactive storytelling may have the potential to amplify these abovementioned effects of transportation by encouraging interaction between the user and the story. First, when users are offered the option to choose freely what a story character would do, they would mentally simulate what the character is experiencing in the story. Such mental simulation would encourage them to develop more vivid mental imagery, regarding the story characters (Escalas, 2004; Green & Brock, 2000). Second, the continuous interaction between the user and the story is likely to enhance their attention to the story content, as contingent website features can encourage users to engage more in the browsing experience through various pathways; contingency websites are known to elevate the sense of novelty and playfulness that captures users' interests and attracts users' attention to the on-screen actions (Bellur & Sundar, 2017; Oh & Sundar, 2015; Sundar et al., 2016).

Finally, by inviting users to actively take part in determining the development of the story plot, an interactive narrative may enhance their emotional involvement. Instead of reading the story through a distant, third-person perspective, users now temporarily share the responsibility of determining the narrative character's fate (Dillman Carpentier et al., 2015; Hoeken & Sinkeldam, 2014; Parrott et al., 2017). Abundant literature in video gaming and immersive media has also suggested the positive effect of having a shared entity like an avatar on increasing empathy and augmenting emotional responses (e.g., Chen et al., 2012; Fabri et al., 2005; Johnson et al., 2018).

To sum up, we propose that interactive storytelling has the potential to further facilitate transportation, which entails greater attention to the story, more vivid mental images of the story character, and a larger emotional impact, specifically due to its perceived contingency. Therefore, we propose the following hypotheses:

H3: Interactive storytelling will enhance narrative transportation to the story.

H4: The effect of interactive storytelling on narrative transportation will be significantly mediated by perceived contingency of the story platform.

Given that Green and Jenkins's model (2014) proposed user control as a potential factor that leads to greater narrative engagement, we also tested perceived user control as a mediator to greater transportation. Side from Green and Jenkins' (2014) proposition, user control has been named as the main indicator of greater cognitive absorption (Agarwal & Karahanna, 2000). Cumulative interactivity research has demonstrated that user control is one of the core features of interactive media that predicts greater user engagement into given tasks (Fan et al., 2017; Liu & Shrum, 2002; O'Brien & Toms, 2008). Perceived contingency of interactive narratives (i.e., the heightened perceptions of dialogue, reciprocity, and threadedness of communication between the user and the interactive story) directly taps into the user experience of choosing the story character's fate, as explained above. However, heightened user control is only loosely connected to the transporting experience. Given the lack of any clear association between user control and transportation in prior literature, we propose the following research question:

RQ1: Would the effect of interactive storytelling on narrative transportation be mediated by perceived user control?

To be transported, readers need to be cognitively attentive to the story, be emotionally involved in the story world, and have vivid mental imagery of the events described in the alternate world (Green & Brock, 2000). Naturally, the link between transportation and story-consistent beliefs has been supported by a number of studies (Van Laer et al., 2014). Recent studies on interactive narratives also support the impact of transportation or narrative engagement induced by interactive narratives on story-consistent beliefs (Jenkins, 2014; Walter et al., 2018). Thus, we propose:

H5: Interactive storytelling will enhance story-consistent beliefs (H5a), which will be serially mediated by perceived contingency of the story website (H5b) and narrative transportation to the story (H5c).

Perceived website contingency has been reported to shape positive website attitudes and greater behavioral intention to revisit the website (Bellur & Sundar, 2017; Sundar et al., 2016). In addition, when users are transported to a story embedded in a website, the heightened level of narrative engagement would also lead to more positive attitudes toward the website itself. Thus, we also propose:

H6: Interactive storytelling will enhance intentions to revisit the website (H6a), which will be serially mediated by perceived contingency of the story website (H6b) and narrative transportation to the story (H6c).

Given that we proposed a research question regarding the impact of user control on transportation, we present additional research questions below:

RQ2: Would the effect of interactive storytelling on story-consistent beliefs be serially mediated by perceived user control of the story website and narrative transportation to the story?

RQ3: Would the effect of interactive storytelling on intentions to revisit the website be serially mediated by perceived user control of the story website and narrative transportation to the story?

Method

A single-factor experimental study with two conditions (interactive condition vs. control condition) was implemented online.

Participants

In total, 134 participants from a crowdsourcing website (mturk.com) completed the experimental study. Only those who reside in the U.S. and successfully finished more than 99% of prior tasks were allowed to participate in the study. "Click" and "scroll" data (M = 11.14, SD = 6.99, Min = 1, Max = 36) was recorded to verify if a participant actually browsed through the web content. On average, participants spent 215.86 seconds reading the story (SD = 128.16, Min = 13, Max = 871). Among them, 33.58% were male and 66.42% were female. The average age of respondents was 42.3 (Min = 20, Max = 77), and the major ethnic group was Caucasians (n = 113, 84.32%), followed by Asians (4.48%), Hispanic (4.48%), and African American (3.73%). Participants' median annual household income was between $40,000 and $49,000.

Procedure

Those who volunteered to participate in the study were redirected from a crowdsourcing website (mturk.com) to the Qualtrics survey platform. Specifically, they were asked to complete the study with either a laptop or desktop computer, as the screen size of mobile devices may constrain the presentation of stimulus content. The Qualtrics questionnaire included three sections: 1) a pretest questionnaire collecting data regarding respondents' general well-being and health indicators, 2) the stimulus website, and 3) a posttest questionnaire. After filling out the pretest questionnaire, participants were provided with a username to access the stimulus website and were randomly assigned to one of the two conditions (the interactive narrative condition; n = 71 vs. the control condition; n = 63), where they were instructed to access the story panel first

and read all content on the website carefully. After browsing the website, participants were instructed to log out from the stimulus site and complete a posttest questionnaire that measured their behavioral intention toward the website and story-consistent beliefs. Upon completion of all three sections of the study, participants were directed back to the crowdsourcing website and were paid $1.75 for their participation.

Stimulus

We operationalize interactive storytelling in the current study as a type of user interface that enables readers to explore the multiple paths–which the narrative character can take–by displaying different portions of the story as users click different buttons. Even though this approach does not provide full control over the narrative content as the traditional "choose-your-own-adventure" narrative does, adopting this simpler user-interface feature as a manipulation of message interactivity brings out two benefits for our study. Theoretically, the current study broadens the scope of interactive storytelling research by showing that a simpler technique such as displaying possible paths for characters, based on the users' choice (as opposed to changing the entire content of the narrative), can be engaging enough for users to experience greater narrative transportation. In addition, the story content provided by the interactive and control websites could remain constant, creating a more robust experimental design.

A professional website developer was hired to construct the stimulus website. The website was titled as "Obesity Info" and included two main features: a map that showed statistics of obesity prevalence in the U.S. and a story panel (Figure 1(a)).[1] Participants were asked to read the story panel first, and only those who followed the instruction were included in the analysis. The stimulus website collected the click data of participants to determine which participants had read the story panel first. The story panel presented the daily life of an obese fictional character, John. Two versions of the story panel were created to conduct the current study: the interactive condition and the control condition. In the interactive condition, the story was presented part-by-part, and, by the end of each paragraph, participants were provided with two to three options to click. Per their selections, different story elements were presented accordingly on the same page. Participants could toggle between different options as they wished.Figure 1(b,c)).

[1]The current study uses a subsample (N = 134) from a larger data set (N = 385) that was reported in a published study (Oh et al., 2018). Participants were randomly assigned to either the high-interactive map or low-interactive map condition, but the variation in the map design did not exert any significant influence on the reported outcomes in the current study and was dropped from all analyses. The perceived contingency was reported as a manipulation check in the published study and is the only variable used both in the current and the published study. Apart from this, there are no other overlapping elements between the two studies.

Figure 1. (a) The homepage of the stimulus website, (b) Screenshots of the interactive storytelling condition, and (c) A screenshot of the control condition. Note: Participants were provided with a piece of the story plot along with a few options to choose (upper image). After they click an option, the relevant story was presented (bottom image). They could then click the "next" button to proceed and continue to read the story, where they would be offered a few buttons to click on and interact with the narrative content again. Note: All the story content and corresponding outcomes of each possible story plot are presented on the same page. Participants would simply scroll down the entire page.

The full story included five sections: John starting his day, meeting his clients at a restaurant, experiencing a heart attack, speaking with his doctor, and trying to tackle obesity issues. In each section, a prompt was included to encourage users to think "what will John do next." By clicking on different options in each section, participants could read what John would experience in terms of potential consequences. To move forward, participants would click on a "Next" button at the bottom of each page to read the next paragraph (Figure 1(b)). The control condition contained all branches of the information that were possible in the interactive narrative on a single page, without any user action, except for a scroll bar. All options and their story elements were listed in a linear fashion on one page (Figure 1(c)). The story in both conditions had 1,027 words to read.

The content between the interactive narrative condition and the control condition had to be standardized, because the only variable manipulated in the study should be the presence of message interactivity within the same story. Thus, in the interactive narrative condition, participants were allowed to toggle between different branches of stories on one page, before moving to the next page In this way, we enabled those in the interactive narrative condition to access to the same amount of content as those in the control condition.

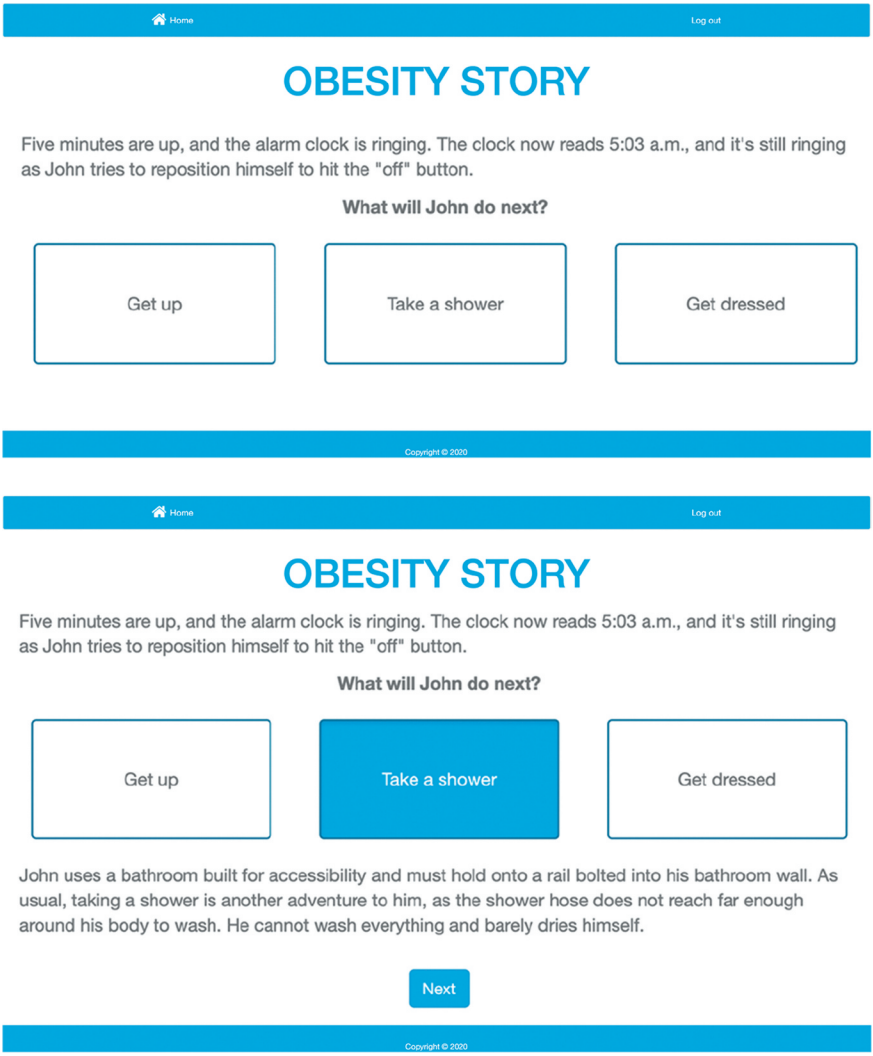

Figure 1. (Continued).

Measurement

Self-reported Measures

Table 1 lists all self-reported items used in our study. Five items of *perceived contingency* measured their perceptions of active dialogue, reciprocity, and threadedness of communication, while navigating on the stimulus website (Sundar et al., 2016) (M = 4.95, SD = 1.47, Cronbach's α =.92). *User control* was measured by two items from Liu and Shrum (2002) (M = 5.90, SD = 1.11,

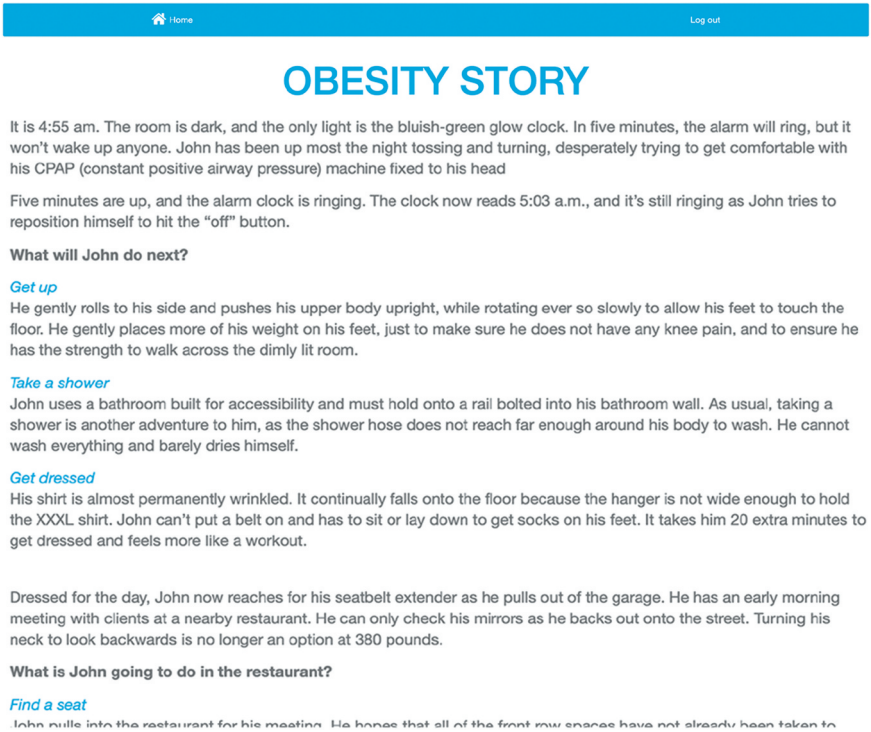

Figure 1. (Continued).

r = .86). The short *transportation* scale (Appel et al., 2015) was used to measure the degree of narrative transportation. These questions captured the extent to which respondents related themselves to the fictitious character and their sentiment, upon reading the struggles of John and the positive outcomes of his success in conquering obesity (M = 5.71, SD = 1.01, Cronbach's α = .78).

Four items asked participants about their *behavioral intention to revisit the website* by tapping the likelihood of visiting the website again or other similar websites of the same obesity topic, adapted from Sundar et al. (2016) (M = 4.77, SD = 1.75, Cronbach's α = .93). Finally, *story-consistent beliefs* were comprised of ten major consequences of obesity (i.e., social stigma, diabetes, sleep problems, hypertension, stroke, etc.) that were depicted in the health-themed story. Participants were asked to evaluate how likely an obese individual would actually experience each symptom after reading the story (M = 6.40, SD = .73, Cronbach's α = .96).

Three variables were controlled for all analyses reported below. Participants' height and weight were self-reported to calculate their *body*

Table 1. Scales used in the posttest questionnaire (all items were measured on a 7-point scale).

Scale	M (SD)	Questions
Perceived contingency	4.95 (1.47) α =.92	"I felt like I was engaged in an active dialogue with the website." "My interactions with the site felt like a back and forth conversation." "I felt as if the site and I were involved in a mutual task of browsing the information." "I felt as if the information on the website was well connected to my actions." "The website was aware of the actions I performed."
Perceived user control	5.90 (1.11) *r* =.86	"While browsing the website, I could freely choose what I wanted to see." "While browsing the website, I felt that I had a lot of control over my experience."
Transportation	5.71 (1.01) α =.78	"I could picture myself in the scene of the events described in the story." "I was mentally involved in the story while reading it." "I wanted to learn how the story could go further." "While reading the story, I had a vivid image of John." "The story affected me emotionally."
Intention to revisit the website	4.77 (1.75) α =.93	Please indicate the likelihood that you will perform the following behaviors in the future: "Recommend the website to others." "Forward the website to my acquaintances." "Visit the website again in the future." "Visit other websites similar to this website."
Story-consistent belief	6.40 (.73) α =.96	Compared with someone who has a normal BMI (body mass index), how likely do you think it might be that an overweight person will experience any of the following problems if s/he is overweight or obese? (much less likely = −3 to much more likely = +3): knee pain, limited clothing options, social stigma, dizziness, heart attack, type 2 diabetes, high cholesterol, hypertension, stroke, sleep problems

mass index (BMI) (M = 27.29, SD = 6.73, Min = 14.64, Max = 53.22, skewness = 1.10). Demographic data, including *gender* (45 males and 89 females) and *age* (M = 42.37, SD = 14.24, Min = 20, Max = 77) were also controlled for.

Behavioral Data

Time spent reading the narrative and the frequency of click/scroll were automatically recorded by participants' log data (N = 132). Time spent reading the narrative was measured–from the moment when they clicked to read the story panel on the homepage (the right panel in Figure 1(a))–to the moment when they came back to the homepage–after reading the story (M = 215.86 seconds, SD = 128.16, Min = 13, Max = 871). In the interactive condition, the frequency of clicking different options (e.g., get up, take a shower, get dressed; Figure 1(b)) was recorded (M = 7.85, SD = 3.77, Min = 2, Max = 21). In the control condition, the frequency

of scrolling down the page (Figure 1(c)) was recorded (M = 14.98, SD = 7.88, Min =1, Max = 36). The amount of time spent reading the narrative was expected to be constant across the two conditions, because the interactive condition provided all possible pathways to explore the same story as the control condition.

Results

Analysis

An independent sample t-test was used to compare time spent reading the story between the two conditions. General linear model (GLM) analyses were first used to examine the effect of manipulation on perceived contingency, user control, narrative transportation, story-consistent beliefs, and intention to revisit the website, while controlling for participants' gender, age, and BMI. Next, we used Model 4 and Model 6 of the PROCESS macro (Hayes, 2013) to investigate the mediating roles of perceived contingency and transportation as proposed in H4, H5, and H6. Lastly, Model 6 of the PROCESS macro (Hayes, 2013) was used to examine if there is a significant serial meditation effect–through perceived user control and narrative transportation–on story consistent belief (RQ2) and on users' intention to revisit the website (RQ3), respectively.

Time Spent Reading the Story

After removing two univariate outliers (M = 205.95, SD = 100.72, skewness = .13, kurtosis = −.30), an independent sample t-test showed that there was no significant difference in the amount of time spent reading the narrative between the interactive (M = 202.79, SE = 10.94) and the control (M = 209.75, SE = 14.43) conditions, t (128) = .39, p = .70. This result provides validation of our manipulation, which provided all possible pathways of the story to the interactive condition.

Perceived Contingency and User Control (H1 and H2)

After controlling for BMI, gender, and age, the analysis showed that participants in the interactive condition reported feeling significantly higher perceived contingency (M =5.44, SE =.17) than those in the control condition [M =4.40, SE =.18), F (1, 129) = 18.63, p < .001, η^2 =.13]. Those in the interactive condition also reported feeling higher user control over the website (M =6.01, SE =.13) than those in the control condition [M =5.69, SE = .14), F (1, 129) = 4.22, p < .05, η^2 =.03]. Thus, H1 and H2 were supported.

Transportation (H3, H4, and RQ1)

As hypothesized, interactive storytelling (M =5.87, SE =.11) significantly enhanced transportation to the story as well, compared to the control condition [M =5.53, SD =.12), F (1, 129) = 4.24, $p < .05$, η^2 =.03]. Thus, H3 was supported. Using Model 4 of the PROCESS macro (Hayes, 2013), we also examined whether perceived contingency and user control mediated the effect of interactive storytelling on narrative transportation. The bootstrapped analyses showed that both variables significantly explained the positive effect of interactive storytelling on narrative transportation to the story. Interactivity of the narrative led to greater perceived contingency (t = 4.31, $p < .001$), which was a positive predictor of narrative transportation (t = 5.30, $p < .001$), after controlling for the effect of interactivity. As a result, the indirect effect of interactivity on narrative transportation was significant and positive through perceived contingency (B = .30, SE = .10, 95% C.I. from .14 to .52). H4 was thus supported.

Similarly, the interactive narrative also led to greater perceptions of user control (t = 2.05, $p < .05$), which was a positive predictor of narrative transportation (t = 3.32, $p < .01$), after controlling for the effect of interactivity. In short, the effect of interactivity on narrative transportation was significantly mediated by user control (B = .10, SE = .06, 95% C.I. from .01 to .24). These results answered our RQ1 proposed earlier.

Story-consistent Beliefs and Intentions to Revisit the Website (H5, H6, RQ2, and RQ3)

Participants in the interactive condition also reported more story-consistent beliefs (M =6.52, SD =.08) than those in the control condition [(M =6.28, SD =.09), F (1, 129) = 3.97, $p < .05$, η^2 =.03]. Intention to revisit the website was different between the two conditions, only at a marginally significant level [F (1, 129) = 3.83, p = .05, η^2 =.03]. Those in the interactive condition showed slightly higher intentions to revisit the website (M =5.04, SD =.20) than those in the control condition (M =4.46, SD =.22).

To examine H5 and H6, mediation analyses were conducted using the Model 6 of the bootstrapped method proposed by Hayes (2013). The results demonstrated that it was the perceived contingency of the interactive story that increased narrative transportation, which enhanced story-consistent beliefs (B = .06, SE = .02, 95% C.I. from .02 to .13) and intention to revisit the website (B = .15, SE = .08, 95% C.I. from .05 to .35). Thus, H5 and H6 were supported. Without the mediating role of contingency, narrative transportation itself did not mediate the effect of interactive storytelling on story-consistent beliefs (B = .01, SE = .03, 95% C.I. from −.05 to .07) nor intentions to revisit the website (B = .02, SE = .09, 95% C.I. from −.14 to .22). (Figure 2

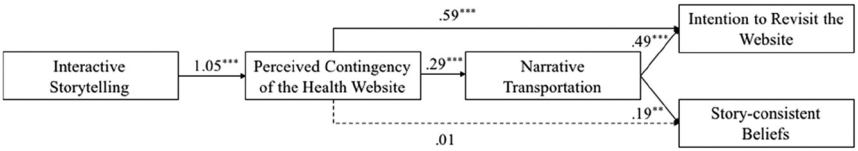

Figure 2. The effects of contingency and transportation on behavioral intention and story-consistent beliefs. Note. **p <.01, ***p <.001. Solid lines are significant. Unstandardized coefficients are reported.

reports unstandardized path coefficients from the analysis that involved two serial mediators (i.e., perceived contingency and narrative transportation).

We examined RQ2 and RQ3 using Model 6 of the PROCESS macro. Results showed that a heightened level of perceived user control enhanced narrative transportation, leading to more story-consistent belief (B = .02, SE = .01, 95% C.I. from .00 to .06) and greater intention to revisit the website (B = .07, SE = .05, 95% C.I. from .01 to .22). Without adding perceived user control as a mediator to the two models, narrative transportation per se did not produce a significant mediating effect on either story-consistent beliefs (B = .04, SE = .04, 95% C.I. from −.01 to .15) or participants' intention to revisit the website (B = .19, SE = .14, 95% C.I. from −.05 to .51).

Discussion

Theoretical and Practical Implications

Whereas Green and Jenkins (2014) has suggested that interactive storytelling would lead to greater persuasion, only a few empirical studies has examined this argument. In particular, former literature has not yet come to a consensus regarding the effect of interactive interfaces on interactive storytelling and its contribution to narrative persuasion. Our result provides empirical evidence that interactive storytelling, compared to the same piece of fixed narrative content, is indeed more persuasive in the context of health communication. Whereas the persuasive impact of narrative and its psychological mechanism have been highlighted by researchers (e.g., Mazzocco et al., 2010; Slater & Rouner, 2002), the role of website interactivity in narrative persuasion has remained relatively unexplored. The current study's finding implies that adding message interactivity to health-themed stories can bring out a synergistic effect on enhancing story-consistent beliefs. Specifically, a heightened level of perceived contingency and user control afforded by the interactive interface explained the theoretical mechanism by which interactive storytelling led to greater story-consistent beliefs about obesity issues. When users were able to control how the story of an obese character could be told–and perceived that the website was aware of and

addressed their choices–these perceptions evoked greater feelings of narrative transportation, even when the story content remained the same across the two conditions.

As for the narrative transportation literature, the current study extends the model proposed by Green and Jenkins (2014) by demonstrating the mediating role of website contingency. In the original model proposed by Green and Jenkins (2014), user control was the only website-related perception that was hypothesized to lead to greater narrative engagement. Our findings not only empirically support their proposition about the impact of user control on narrative transportation, but also adds another theoretical route to the model: perceived contingency. In other words, it is not simply the fact that users experience greater feelings of control over the narrative's flow; it is the contingent response from the website that almost resembles the continuous, back-and-forth dialogue between two social beings (Sundar et al., 2016) that evokes greater narrative engagement. In particular, our data analysis demonstrated that without the perceptions of website contingency, narrative transportation itself could not explain the effect of interactive storytelling on participants' story-consistent beliefs. By emphasizing the role of perceived contingency, the current study integrates the recent findings in interactive media literature into the discussion of narrative transportation, bridging two different fields of research.

In the HCI literature, our findings push the boundaries of the possible impact of website features. Whereas prior studies (Bellur & Sundar, 2017; Sundar et al., 2016) reported the significant effects of message interactivity and perceived contingency on website-related attitudes and issue evaluations (e.g., health attitudes), the current study finds that greater perceived contingency and user control induced by interactive storytelling can also enhance health beliefs regarding the common risks related to obesity, as the story implied. This finding extends the argument that interface perceptions are key predictors of positive attitudes and intentions toward the website (Oh et al., 2018; Sundar et al., 2015); in our study, perceived contingency not only changed website-related intentions, but also influenced how much users were cognitively and emotionally engaged with the content of a fictional story, motivating them to identify with fictional characters and increasing the emotional impact of the story.

Given the rapidly changing nature of media technology, interactive narrative has a wide application to many different domains, alongside the obesity issue examined in the current study. For the health communication literature, our findings shed light on the nature of interactive media platforms that are designed to encourage user participation. As users decide how they view health messages, the impact of the messages can be significantly expanded, because the engaging browsing experience helps them become more immersed into the narrative world. Given that interactive storytelling is

an easy and versatile element to add to many health-related topics, we encourage health website designers to consider including such feature.

It should be noted that interactive storytelling can be implemented in many different platforms and modes. The current study demonstrated how message interactivity added to a story presented in a textual format can be transporting and persuasive; however, visual storytelling in video games and virtual reality is inherently interactive in that the story can be told only if users (or players) take action. Feelings of transportation in visual storytelling have also been found to lead to emotional engagement and belief changes (e.g., Burrows & Blanton, 2016; Mahood & Hanus, 2017). Whereas the level of user involvement is typically much higher in visual storytelling, the fundamental appeal of interactivity that provides greater choice over different story paths–and responds to users' choices in a contingent manner–may remain the same. For instance, a virtual reality application that enables alternative story paths can be more engaging and persuasive than the same story without these features. Future studies could extend the application of message interactivity to other platforms and examine its explanatory power.

Except for perceived contingency, the effect sizes for dependent variables in the current study were small. Our study was designed to examine the effect of interface features while maintaining the story content constant across the two conditions. Given that the only difference between the two conditions was the presence of additional buttons and hyperlinks, it is natural to observe small effect sizes for narrative transportation and story-consistent beliefs, whose variances would be largely influenced by the story content, not the interface design.

Limitations

Our sample had a total of 134 participants, with relatively more female participants (66.42%) than male participants (33.58%). Even though the impact of gender was controlled for in the analysis, future studies should employ a more balanced sample. Given that only one website featuring a story of obesity was used in the current study, the suggested mechanism of interactive storytelling here ought to be reexamined in the context of other popular health issues, such as anti-smoking, drug abuse, alcohol consumption, and more.

We also suggest that future studies explore the role of issue involvement and enhance the generalizability of current findings. In our study, participants' average BMI score was 27.29, which belongs to the overweight category, not the obese category (CDC, 2020). Even though the findings reported here were obtained after we controlled for individuals' BMI scores, those who actually suffer from obesity-related health issues may show different responses to interactive storytelling. Future studies

should examine the impact of interactive storytelling on those who are more likely involved in the issue.

Another limitation to be addressed by future research is the possibility of the different amount of information consumed by the interactive and control conditions. Although we enabled participants in the interactive condition to toggle between different paths of the story, the actual amount of information consumed by those in the interactive condition may be smaller than those in the control condition, unless they volunteered to click all possible options. Whereas the fact that we found an equal amount of time spent reading the story across the two conditions minimizes this concern for the current study, future research should attempt to create a yoked control condition, where the participants in the control condition are exposed to the exact same information content as those in the experimental condition.

Story-consistent beliefs were measured only after their exposure to the story. We do not have information about how participants' preexisting beliefs played a role in the result nor how much change in their beliefs was made by the single-exposure to the health-themed story. Future studies can design a longitudinal study to examine whether interactive storytelling can be an effective strategy for intervention that can sway users' health beliefs.

The health-themed story used in the current study encouraged participants to think about what *the character* (John) will do next, as opposed to what *they* would actually do. According to Green and Jenkins (2014), the type of the prompt makes a difference in the level of identification with narrative characters; individuals tend to identify with characters more when they are asked to imagine what *they* would do. Future studies can examine identification as another indicator of narrative engagement and investigate whether putting oneself in the character's shoes completely can create a larger variance in engagement than the current study's message design.

Conclusion

Given the rapidly changing nature of media technology, the "choose- your-own-adventure" type of storytelling has a wide application to many different domains, not just health communication. The current study explored how an interactive story of an obese character influences users' story-consistent beliefs and intention to revisit the health website, and identified the important roles of perceive contingency, user control, and narrative transportation in the persuasive impact of interactive storytelling. The findings will contribute to enhancing our knowledge on the psychological mechanism of user interactions on new media platforms and help both researchers and practitioners to take advantage of the persuasive potential of interactive storytelling.

Disclosure statement

No potential conflict of interest was reported by the authors.

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