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In-store interactive advertising screens: the effect of interactivity on impulse buying explained by self-agency

In-store
interactive
advertising
screens

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Abstract

Purpose – Physical stores are increasingly dependent on impulse visits and the impulse purchases of passers-by. Interactive advertising screens in store windows could help retailers increase impulse-visit urges and impulse-buying urges. However, the effects of interactive screens in physical surroundings have not been studied before. Therefore, this study aimed to examine the effect of interactive screens on impulse urges and gain insight into the underlying mechanism that explains the possible effect.

Design/methodology/approach – An interactive screen was placed in a store window. Using three field experiments, we studied the effect of interactivity-level (high vs low) on the impulse-visit and impulse-buying urges of passers-by, and the mediating role of self-agency in these effects.

Findings – Highly interactive (compared to less interactive) advertising screens in store windows positively affect impulse-visit and impulse-buying urges through self-agency. Retailers can therefore use interactive advertising screens to increase the number of impulse purchases if feelings of self-agency are activated.

Originality/value – This is the first study to examine the extent to which interactive screens in a store window enhance the impulse-visit and impulse-buying urges of passers-by and the mediating factor of these

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effects. By conducting three field experiments, we achieved a high external validity and managed to share very reliable results owing to the replication of the findings.

Keywords Interactivity, Interactive screens, Store, Shop, Impulse buying, Impulse purchases, Impulse visits, Self-agency

Paper type Research paper

Introduction

The digital and physical worlds are increasingly merging in retail settings (Brynjolfsson *et al.*, 2013). Typical online functionalities, such as interactive screens, have started entering physical store environments (e.g. Macy's, Adidas and Coca-Cola [1]; Pantano, 2016). The growing implementation of in-store interactive screens is, arguably, a logical result of (1) the habituation of consumers to shop and communicate through digital screens and other interactive in-store channels, (2) the increasingly active role that consumers play in the communication between brands and consumers and (3) the fact that interactivity has become a crucial element in marketing practice (Wang, 2021). Remarkably, the effects of such interactive screens in physical storefronts on persuasive outcomes, such as impulse buying, are unclear. Physical stores depend more than ever on impulse visits and impulse purchases of passers-by, owing to the increased competition with online shops (Mehra *et al.*, 2017). Therefore, retailers should use new marketing stimuli, such as interactive innovations (e.g. Berry *et al.*, 2010), to enhance impulse visits and impulse buying (Iyer *et al.*, 2020). Based on a qualitative study, Pantano (2016) suggests that compared to online stores, offering interactive content in shopping windows may improve the competitive positions of physical stores. Although research on interactivity and impulsivity is highly valuable for both researchers and practitioners, the effects of interactive content in storefronts on such visits and purchases have not yet been examined. Therefore, this study aims to answer the following two questions: Can interactive screens in store-windows trigger impulse visits and impulse-buying urges? Moreover, what mechanism could explain this effect if so? By ascertaining the above, this study makes a unique contribution to the interactive-marketing literature and responds to the notion that more research on newly developed technologies in interactive marketing is necessary (Wang, 2021).

Based on previous research on interactivity in online contexts, interactive screens could arguably increase impulse-visit urges and impulse-buying urges (e.g. Kim and LaRose, 2004; Huang, 2016; Yim *et al.*, 2017; Hu and Wise, 2021). However, these studies state either that interactivity and impulsivity are *related* to each other or that interactivity can positively affect persuasive outcomes in general. They do not provide any insights into the *causal effect* of interactivity on *impulsivity*. This study, however, conducts three field experiments and *can* therefore draw valid conclusions on the effect of interactivity on impulse-buying urges. Moreover, the abovementioned studies were conducted in an (experimental) online setting. Online shopping motivations and behavior do not necessarily correspond with offline shopping motivations and behavior (Haridasan and Fernando, 2018); therefore, it is still unclear whether the results of online studies hold in physical surroundings. Furthermore, in-store shoppers (compared to online shoppers) are known to value interaction (Haridasan and Fernando, 2018). It is therefore remarkable that the effect of interactivity on impulse buying has not been studied in the context of physical shopping. Accordingly, the first aim of this study is to examine whether interactive screens in store windows positively affect impulse-visit urges and impulse-buying urges. This could provide relevant insights literature on interactive-marketing and for practice (Pantano, 2016).

This study's second aim is to gain insight into the underlying mechanisms that explain the possible effects of interactive screens on impulse-visit urges and impulse-buying urges. Although previous research on underlying mechanisms of impulse buying contributed

significantly to the body of knowledge (e.g. [Styvén et al., 2017](#)), many studies assert that the antecedents, manifestations, underlying processes and consequences of impulse buying, particularly as they pertain to interactive choice contexts, are still poorly understood ([Pham et al., 2017](#)). This study aims to clarify which psychological state, triggered by interactivity, enhances impulse visits and impulse purchases. The agency model of customization (AMC; [Sundar, 2008](#)) suggests that interactive techniques could possibly enhance self-agency, which could increase positive attitudes toward displayed content. We will explore, with three field experiments in an Amsterdam-based clothing store, the extent to which self-agency contributes to the effects of interactivity on impulse-visit urges and impulse-buying urges. Herewith, we contribute to the interactive-marketing literature since self-agency is not studied before as a possible mediator that could explain the positive effects of interactivity.

Theoretical background and hypotheses development

Impulse visits and impulse buying

Impulse purchases can be defined as unplanned purchases accompanied by a sudden and strong urge to buy ([Rook, 1987](#); [Amos, 2014](#)). Building on this definition, we define impulse visits as the unplanned entry into a physical store accompanied by a sudden strong urge to do so.

A meta-analysis on impulse buying ([Amos, 2014](#)) shows that antecedents of impulse buying can be categorized into dispositional factors (e.g. impulse-buying trait), sociodemographic factors (e.g. age) and situational factors (e.g. retail environment). Additionally, research shows that internal perceptions (e.g. time pressure), product characteristics (e.g. hedonic products) and product's promotion factors (e.g. discounts) affect impulse buying (see [Khan et al., 2015](#)). More specially, for the impulse buying of fashion items, [Lee and Johnson \(2010\)](#) stress the effect that store layout has on consumers' impulse buying. Compared to impulse buying, impulsive store visits are studied less often. However, it is known that store visits and impulse buying are often triggered by the same antecedents. For example, both store visits ([Baek et al., 2020](#)) and impulse buying ([Sun and Yazdanifard, 2015](#)) are stimulated by sensory experiences. It can be concluded that various antecedents affect both impulse buying and store visits. However, studies have not yet identified the effect of in-store interactive advertising screens on impulse-visit urges and impulse-buying urges.

Effect of interactivity on impulse urges

Interactive advertising screens can be classified under user-machine or user-message interactions, depending on the screen's features. In user-machine interaction, the emphasis lies on human interaction with computers. User-message interaction entails the possibility of users modifying a message ([Liu and Shrum, 2002](#)). Based on different interactivity types, [Liu and Shrum \(2002, p. 54\)](#) propose the following definition of interactivity: "The degree to which two or more communication parties can act on each other, on the communication medium, and on the messages and the degree to which such influences are synchronized." They also suggest that interactivity encompasses three dimensions: active control, two-way communication and synchronicity (also see [Liu, 2003](#)).

Even though mixed results on the effect of interactivity have been found ([Wu, 2005](#)), the notion that interactivity can affect persuasive outcomes for the better seems widely accepted (e.g. [Chattaraman et al., 2014](#)). For instance, studies demonstrate that interactivity positively affects constructs such as consumers' perceptions of usefulness and enjoyment ([Yim et al., 2017](#)), attitudes ([Hu and Wise, 2021](#)) and online buying activity ([Kim and LaRose, 2004](#)). A meta-analysis of 63 studies on web interactivity underlines this notion and shows that it is positively correlated with attitudes and desirable behavioral intentions of consumers ([Yang](#)

and Shen, 2018). Additionally, Kakalejčik *et al.* (2020) show that positive experiences between companies and consumers with respect to online interactions can enhance consumers' (re) visit behavior and purchase behavior. Correspondingly, Bressolles *et al.* (2007) argue that website interactivity benefits feelings of gratification and could therefore induce buying impulses. They found that interactivity and impulse-buying buying urges are positively related. Additionally, through a survey, Huang (2016) showed that online interactive activity (browsing) and impulse buying are related.

It is interesting to study the extent to which the positive effects of interactivity in online settings will hold in offline settings, as online consumers differ from offline consumers. The former seek variety (e.g. Donthu and Garcia, 1999) and convenience (Monswé *et al.*, 2004) more often than the latter. Additionally, some consumers prefer to interact in an online retail setting over interacting in an offline retail setting (Becker and Pizzutti, 2017). Moreover, some consumers can experience more risk when shopping online than when shopping offline (see Kim *et al.*, 2020). These differences could imply that the positive effects of online interactivity do not necessarily apply to in-store interactivity. However, this study examines the effect of in-store interactive digital screens, which are in functionality and use comparable with interactive digital screens that are used for online shopping, such as laptop-screens. Therefore, we also expect a positive effect of interactivity as a functionality of digital screens in physical shop windows on impulsive consumer behavior.

Impulsive consumer behavior may manifest itself in various ways. In general, one may argue that such behavior manifests itself in terms of *experiential* shopping motives and behavior (where the experience itself is the goal of the behavior), as well as *materialistic* motives and behavior (where the acquired product is the goal of the behavior, see e.g. Carter and Gilovich, 2012). In the current context such experiential behavior translates into impulse store visits while materialistic behavior translates into impulse buying. There is no *a priori* reason to suspect that interactivity affects both types of impulsive consumer behavior differently (see Prediger *et al.*, 2019). However, considering marketing implications, a separate examination of the effect of interactivity on both types is interesting. A visit does not necessarily result in a purchase (Vukadin *et al.*, 2016). Likewise, with the possibility of online purchases store visits are no longer essential to impulse buying. We, therefore, explicitly distinguish impulse visits from impulse purchases and propose the following two hypotheses:

H1a. High interactivity leads to stronger impulse-visit urges than low interactivity.

H1b. High interactivity leads to stronger impulse-buying urges than low interactivity.

Self-agency as a mediator in the effect of interactivity on impulse urges

We further study the extent to which the positive effects of interactivity can be explained by self-agency. Self-agency refers to the feeling that one shapes her/his own actions and, therefore, is frequently intertwined with freedom of choice (Barlas and Obhi, 2013). According to Reactance Theory (Brehm, 1966), people are easier to persuade when they feel free to make their own choices (e.g. through interactive content, see Hu and Wise, 2021) than when they feel threatened in this freedom (e.g. by non-interactive ads; see Edwards *et al.*, 2002). Correspondingly, Hu and Wise (2021) showed that the interactive elements of playable ads (indirectly) reduced perceived freedom threat, and therefore decreased consumers' resistance to the ads. Self-agency has been found to (unconsciously) strengthen a sense of authorship (e.g. Aarts *et al.*, 2009), empowerment and mastery (e.g. Chiu *et al.*, 2013) and may therefore be expected to represent the opposite of freedom threat. In line with Hu and Wise, we will examine to what extent interactivity enhances feelings of self-agency and, subsequently, if self-agency affects impulse buying.

Customization is known to evoke feelings of self-agency (Sundar, 2008). The possibility of customization allows consumers to actively to adjust the content on, for example, an interface. Therefore, this option makes users part of the communication process rather than just the receivers, which, in turn, enhances feelings of self-agency (Sundar, 2008). Without implying that customization and interaction are the same, it could be argued that the option to change the communication process actively (e.g. changing the interface) plays an important role in both constructs. Furthermore, although it has not provided proof, the AMC (Sundar, 2008) proposes that interactivity techniques may enhance agency (also see Sundar and Marathe, 2010, p. 304).

This agency model also posits that self-agency results in positive attitudes toward the displayed content (Sundar, 2008). Attitudes toward products are known to correlate with impulse-buying behavior (Chen, 2008), indicating that self-agency may lead to higher impulse-visit urges and impulse-buying urges. Moreover, the literature reveals that people who experience a high sense of self-agency perceive messages as more important and are easier to persuade, to visit and buy impulsively for example, than people who experience a low sense of self-agency (Kang and Sundar, 2016), corresponding with Reactance Theory.

Similar as the reasoning for hypothesis 1a and 1b, there are no *a priori* reasons to suspect that interactivity affects both types of impulsive consumer behaviors through different processes (see e.g. Prediger *et al.*, 2019). Based on the preceding, the following hypotheses are formulated (see Appendix 1 for conceptual model):

H2a. Self-agency mediates the effect of interactivity (high vs low) on impulse-visit urges.

H2b. Self-agency mediates the effect of interactivity (high vs low) on impulse-buying urges.

Overview of studies

We conducted a series of three field experiments (Experiments 1, 2a and 2b) to test the hypotheses. All experiments have a one-factor between-subject design with “level of interactivity” (low vs high) as the independent variable and “impulse-visit urge” and “impulse-buying urge” as dependent variables. We tested the hypotheses at a significance level of 0.05. The experiments have a total sample size of 436 consumers. The required sample size was calculated *a priori* with G*Power in the *F* tests family. The expected effect size (f^2) we used to calculate the sample size was 0.15 since previous research found an average effect size of 0.17 when measuring the effect of marketing stimuli on impulse-buying behavior (Iyer *et al.*, 2020). As there is just one predictor in our studies (interactivity), a total sample size of at least 89 participants per study was needed according to G*Power tool, a requirement that we have met in all experiments.

The first experiment is both confirmative and explorative in nature since some additional exploratory variables were examined next to the hypotheses testing (see Experiment 1, “Measurements”). Both the second experiment and third experiment are solely confirmative in nature and were performed to check whether the results of Experiment 1 could be replicated. Replication is often undervalued, although of great importance for gaining confidence in the found results (McEwan *et al.*, 2018). The data for Experiment 1 were collected in one week, the data for Experiments 2a and 2b were collected in two weeks each. All three experiments had an approximately equal number of participants per day, except Sundays, when the shop was closed. All experiments included a manipulation check. Below we describe the method, results, and discussion for each experiment.

Experiment 1

Method. Stimulus material. An interactive screen (42 inches) was placed in the window of a women’s clothing store located in a well-visited, high-end shopping street in Amsterdam,

Netherlands. The content and functionalities of the screen were specifically designed for the three experiments. In line with Liu and Shrum's (2002) conceptualization, screen interactivity was manipulated through active control, two-way communication and synchronicity. In both conditions, participants had to press play to start interacting with the screen. In the high-interactivity condition, participants could interact with the screen by swiping through the store's collection and zooming in on the displayed items (active control). Users could also like products by pressing on a "thumbs up" and interact with the screen by leaving a comment. Both were followed by a short reaction displayed on the screen (two-way communication). Additionally, in the high-interactivity condition, the screen responded immediately to the user's actions (synchronicity). In the low-interactivity condition, participants had fewer interaction options. After pressing play, they could only reverse the order in which items were shown instead of swiping through them. They could not zoom-in, like, or rate any products or the screen itself, and the response time of the screen on the user's action was delayed by a full second. The two conditions differed in the interactive features only. All other elements, such as content and size, were identical (see Appendix 2).

Participants. All participants ($N = 102$) were adults ($M_{age} = 48.42$, $SD = 19.96$) and passers-by of the store where the interactive screen was located. Only women were approached to participate since the store in question only sells women's clothing. The participants fitted the natural group that could possibly be induced to buy impulsively at the store.

Procedure. The condition the participants were exposed to depended on the day they were asked to participate. The conditions were altered every day and week (also between the three experiments) to counterbalance the possible effect that "day of the week" could have on the dependent variables.

We hired student assistants to collect the data in the shopping street where the store was located. They attended a short training in advance, where they were trained on how to approach passers-by and what procedure to follow during data collection. After reading and signing an informed consent that, among other things, stated that participation was voluntary, participants were asked to use the screen in the store window. Since Experiment 1 was a partially explorative study, the participants were either asked to interact with the screen for one minute or for as long as they pleased, so it could be determined if a set interaction time would lead to different results than with no set time. Next, the participants filled in the questionnaire to measure the dependent and mediating variables. Afterward, they could voluntarily leave their email addresses to participate in a raffle to win a voucher worth 50 euros for the store in question. Last, all participants were debriefed and thanked for their participation.

Measurements. All constructs were measured using established measurement instruments from previous literature, on seven-point Likert scales (1 = totally disagree and 7 = totally agree).

Manipulation check. More interactive options do not necessarily mean higher perceptions of interactivity (Voorveld *et al.*, 2011). We further measured active control, two-way communication and synchronicity (Liu and Shrum, 2002), and overall perceived interactivity to ascertain whether the high-interactivity condition resulted in more feelings of interactivity than the low-interactivity condition [2]. See Table A1 in Appendix 3 for the manipulation-check measurements for each experiment.

Dependent variables. Impulse-buying urge was measured using a three-item scale (explained variance = 76.26%, Cronbach's alpha = 0.84). Two of the items were based on a scale used by Sultan *et al.* (2012), namely, "I feel a strong urge to buy (one of) the products that the screen displayed" and "I want (one of the) products that the screen displayed." The third item was added to validate the definition of impulse buying, where *unplanned* needs play an important

role: “I did not intend to buy (one of) the displayed products, but I now have the desire to do so.”

We could not find an existing scale that measures impulse-visit urges. Therefore, we adjusted the scale we used to measure impulse-buying urges as follows: “I feel a strong urge to enter this store,” “I want to visit this store,” “I did not intend to visit this store, but now I do feel the desire to do so” (explained variance = 80.24%, Cronbach’s alpha = 0.88).

Mediator. Self-agency was measured using the items “It felt like I was responsible for what happened on the screen” and “It felt like I was the one influencing what happened on the screen,” based on a scale by Ruth *et al.* (2002) (explained variance = 90.01%, Cronbach’s alpha = 0.96). See Table A2 in Appendix 3 for an overview of all key measurements that were used per experiment.

In addition to the constructs displayed in Table A2, we measured several other variables in Experiment 1 for exploratory reasons, such as feelings of product ownership and numerous emotions [3].

Results

The manipulation check showed that participants significantly scored higher ($t = -4.90$, $p < 0.001$) on active control in the high-interactivity condition ($M = 4.34$) than in the low-interactivity condition ($M = 2.73$). This was also the case for overall perceived interactivity ($M = 3.67$ vs $M = 2.42$, $t = -4.14$, $p < 0.001$). The manipulation succeeded.

To test H1a and H1b (high interactivity leads to stronger impulse-visit urges and impulse-buying urges than low interactivity), we performed a one-way ANOVA. Results show that both direct effects are not significant (impulse-visit urges: $F(1, 96) = 0.10$, $p = 0.754$; impulse-buying urges: $F(1, 96) = 2.51$, $p = 0.259$). We also tested the proposed mediation hypotheses, such that self-agency mediates the effect of interactivity (high vs low) on impulse-visit urges and impulse-buying urges, using PROCESS’s model number 4 (Hayes, 2017). These analyses show that interactivity does not affect impulse-visit urges through self-agency (H2a, 95% CI: $[-0.01$ to $0.76]$). Therefore, hypotheses 1a, 1b and 2a are rejected.

We did find a positive effect of interactivity on self-agency ($b = 1.22$, $SE = 0.28$, 95% CI: $[0.66$ to $1.78]$) and of self-agency on impulse-buying urges ($b = 0.31$, $SE = 0.10$, CI: $[0.11$ to $0.51]$). Subsequently, we find a positive mediation effect of interactivity through self-agency on impulse-buying urges ($b = 0.38$, $SE = 0.18$, 95% CI: $[0.10$ to $0.81]$). Hypothesis 2b, self-agency mediates the effect of interactivity (high vs low) on impulse-buying urges, is therefore accepted. See Table A3 in Appendix 3 for the means of the outcome variables of each experiment.

Discussion

We did not find a direct effect of interactivity on impulse urges in Experiment 1. Nevertheless, we performed mediation analysis as a direct effect of X on Y is not required in modern mediation analysis: “Statistical mediation analysis has changed since the publication of Baron and Kenny (1986). The heyday of the causal steps ‘criteria to establish mediation’ approach is over. . . . Modern mediation analysis emphasizes an explicit estimation of the indirect effect, . . . and an acknowledgment that evidence of a statistically significant association between X and Y is not necessary to talk about and model intervening variable processes . . .” (Hayes, 2017, p. 146). The mediation analysis shows an indirect effect of interactivity on impulse-buying urges through self-agency. There are no effects found on impulse-visit urges. Since Experiment 1 was partially explorative in nature, we replicate the study in Experiment 2a and Experiment 2b to confirm the results.

Experiment 2a and experiment 2b

Method. Stimulus material and procedure. For Experiment 2a and Experiment 2b, the same stimulus material was used, and largely the same procedure was followed as in Experiment 1. Experiment 1 participants were asked to interact with the screen either for one minute or for as long as they pleased. Since interaction time did not influence the results, we decided to ask all participants in Experiments 2a and 2b to interact with the screen for as long as they pleased to create a more natural situation for all participants. However, we set a minimal interaction time of 40 seconds, to provide the user with enough time to explore the condition.

Participants. The samples of Experiments 2a ($N = 153$) and 2b ($N = 190$) were similar to those of Experiment 1. The mean ages in Experiment 2a and 2b were 47.69 ($SD = 17.79$) and 49.37 ($SD = 19.12$), respectively. All participants were again adult passers-by and female. Seven of the participants in Experiment 2b had already participated in Experiments 1 or 2a and were therefore excluded from further analyses ($N = 183$).

Measurements. *Manipulation check.* We used the same manipulation check as in Experiment 1 (see Table A1 in Appendix 3). In Experiment 2a active control had a Cronbach's alpha of 0.75, two-way communication of 0.81 and synchronicity of 0.75. In Experiment 2b active control had a Cronbach's alpha of 0.82, two-way communication of 0.70 and synchronicity of 0.83.

Dependent variables and mediators. As in Experiment 1, we measured impulse-buying urges (Experiment 2a: explained variance = 70.23%, Cronbach's alpha = 0.79; Experiment 2b: explained variance = 74.01%, Cronbach's alpha = 0.82), impulse-visit urges (Experiment 2a: explained variance = 73.40%, Cronbach's alpha = 0.82; Experiment 2b: explained variance = 73.62%, Cronbach's alpha = 0.82), and self-agency (Experiment 2a: explained variance = 95.32%, Cronbach's alpha = 0.91; Experiment 2b: explained variance = 87.79%, Cronbach's alpha = 0.86; see Table A2 in Appendix 3). In Experiment 1, we also asked about some additional variables for exploratory reasons. Since these variables were not affected by interactivity, we did not measure them again in Experiment 2a and Experiment 2b. Therefore, these experiments can be considered as more confirmative in nature than Experiment 1 [4].

Results

Participants in Experiment 2a scored significantly higher on active control in the high-interactivity condition ($M = 3.56$) than in the low-interactivity condition ($M = 2.92$; $t = -3.63$, $p < 0.001$). They also scored significantly higher on two-way communication ($M = 3.64$) in the high-interactivity condition than in the low interactivity condition ($M = 2.33$; $t = -4.84$, $p < 0.001$), on synchronicity ($M = 3.68$ vs $M = 2.63$, $t = -4.05$, $p < 0.001$), and on overall perceived interactivity ($M = 4.31$ vs $M = 2.79$, $t = -5.22$, $p < 0.001$). Also in Experiment 2b participants scored significantly higher on all manipulation-check variables in the high-interactivity condition than in the low-interactivity condition (active control: $M = 4.45$ vs $M = 2.69$, $t = -6.35$, $p < 0.001$; two-way communication: $M = 3.58$ vs $M = 2.59$, $t = -3.81$, $p < 0.001$; synchronicity: $M = 3.98$ vs $M = 2.98$, $t = -3.47$, $p = 0.001$; overall perceived interactivity: $M = 4.31$ vs $M = 2.84$, $t = -5.76$, $p < 0.001$). The manipulation in Experiments 2a and 2b therefore succeeded.

In line with the results of Experiment 1, a one-way ANOVA showed that there is no direct effect of interactivity on impulse-visit urges ($F(1, 151) = 0.92$, $p = 0.338$) and impulse-buying urges (H1b, $F(1, 151) = 0.69$, $p = 0.406$) in Experiment 2a. Similarly, also in Experiment 2b no direct effects of interactivity on impulse-visit urges ($F(1, 188) = 1.12$, $p = 0.292$) and impulse-buying urges ($F(1, 188) = 3.18$, $p = 0.076$) were found. Therefore, hypotheses 1a and 1b are rejected.

The mediation hypotheses were again tested in PROCESS. Experiment 2a shows a positive significant effect of interactivity on self-agency ($b = 1.79$, $SE = 0.26$, 95% CI: [1.28 to 2.30]) and of self-agency on impulse-visit urges ($b = 0.17$, $SE = 0.07$, 95% CI: [0.03 to 0.32]). Subsequent to these results, but opposite to the results of Experiment 1, we found a

significant positive indirect effect of interactivity on impulse-visit urges through self-agency in Experiment 2a ($b = 0.31$, $SE = 0.15$, 95% CI: [0.03 to 0.62]). Experiment 2b shows similar results. There is a positive effect of interactivity on self-agency ($b = 1.38$, $SE = 0.24$, 95% CI: [0.92 to 1.85]) and a positive effect of self-agency on impulse-visit urges ($b = 0.37$, $SE = 0.07$, 95% CI: [0.24 to 0.51]). Subsequently, we also find in Experiment 2b a significant positive indirect effect of interactivity on impulse visit urges through self-agency ($b = 0.52$, $SE = 0.14$, 95% CI: [0.28 to 0.82]). Based on Experiment 2a and 2b, [hypothesis 2a](#), self-agency mediates the effect of interactivity (high vs low) on impulse-visit urges, is therefore accepted.

[Hypothesis 2b](#), self-agency mediates the effect of interactivity (high vs low) on impulse-buying urges, is – in line with the outcomes of Experiment 1 – also accepted based on the results from Experiments 2a and 2b. Experiment 2a shows that interactivity has a positive effect on self-agency ($b = 1.79$, $SE = 0.26$, 95% CI: [1.28 to 2.30]), and self-agency has a positive effect on impulse-buying urges ($b = 0.25$, $SE = 0.06$, 95% CI: [0.12 to 0.37]). Subsequently, there is an indirect effect of interactivity through self-agency on impulse-buying urges ($b = 0.44$, $SE = 0.12$, 95% CI: [0.21 to 0.69]). Experiment 2b also shows an effect of interactivity on self-agency ($b = 1.38$, $SE = 0.24$, 95% CI: [0.92 to 1.85]) and of self-agency on impulse-buying urges ($b = 0.31$, $SE = 0.06$, 95% CI: [0.19 to 0.43]). Again, an indirect effect of interactivity on impulse-buying urges through self-agency was found ($b = 0.43$, $SE = 0.13$, 95% CI: [0.21 to 0.70]). See [Table A3](#) in [Appendix 3](#) for the means.

Discussion

Experiments 2a and 2b, similar to Experiment 1, show no direct effect of interactivity but do show an indirect effect of interactivity on impulse-buying urges through self-agency. Experiments 2a and 2b find the same pattern for impulse-visit urges in PROCESS, namely, a positive indirect effect of interactivity through self-agency on impulse-visit urges. This result was not observed in Experiment 1, which may be attributed to its slightly smaller sample size compared to the sample sizes of the other two experiments. This reasoning seems plausible as the mediation effect of interactivity on impulse-visit urges through self-agency in Experiment 1 was close to significant (95% CI: [-0.01 to 0.76]).

General discussion

Conclusion

Interactive screens in stores are on the rise and could help retailers strengthen their competitive positions ([Pantano, 2016](#)). This study examines the extent to which interactive screens in a clothing store's window enhance impulse-visit urges and impulse-buying urges of passers-by, and what mediates this effect. We performed three field experiments: Experiment 1 was partially explorative, Experiment 2a was confirmative and in Experiment 2b replicated the second experiment, to ensure the reliability of the results ([McEwan et al., 2018](#)). We showed, for the first time, that self-agency functions as an underlying mechanism that explains the positive effect of interactivity on impulse-visit and impulse-buying urges.

Theoretical implications

This study examined the effects of interacting with a digital screen in a real-life shopping environment, a physical store. Previous studies on interactivity mostly focused on (experimental) online settings (e.g. [Kim and LaRose, 2004](#); [Lee, 2005](#); [Macias, 2003](#)). Surprisingly, previous studies on interactivity scarcely investigated the effects on impulse-visit urges and impulse-buying urges. Furthermore, self-agency has not been studied before as a possible mediator in the effect of interactivity on impulse buying. Therefore, this paper also contributes to the literature by providing insights into the underlying impulse-buying

mechanisms. Following this, we responded to the notion that the inner psychological states impulse buying derives from are complex and not yet totally clear (Pham *et al.*, 2017).

In two out of three experiments we found an indirect effect of interactivity on impulse-visit urges through self-agency. In Experiment 1, we only found an indirect effect of interactivity through self-agency on impulse-buying urges, and not on impulse-visit urges. As discussed previously, the lack of this effect could be attributed to the smaller sample size of Experiment 1 (compared to Experiments 2a and 2b). An alternative explanation could be that the explaining mechanism in the effect of interactivity on impulse visit urges partially differs from the explaining mechanism in the effect of interactivity on impulse buying urges. So far, the literature did not give reasons to suspect that the effect of interactivity on both dependent variables would be explained by different mediators (see e.g. Prediger *et al.*, 2019). However, the results of Experiment 1 indicate that it would be interesting to explore the existence of different mediators in the effect of interactivity on impulse visits and impulse purchases.

In line with our expectations, all three field experiments showed that self-agency functions as a mediator in interactivity's effect on impulse-buying urges. This corresponds with the AMC, which suggests that interactivity techniques could enhance agency and that self-agency could affect attitudes toward displayed items (Sundar, 2008). By proving that self-agency can enhance impulse urges, we introduce the term "the self-agency paradox," which means that when people think they are in charge of what happens and feel as though they cause certain events (self-agency), they are actually less in charge than they assume (Kang and Sundar, 2016) and are more likely to yield to their impulses. A possible explanation for this paradox can be found in Reactance Theory, which states that people who feel free to make their own choices (which is often intertwined with feelings of self-agency (Barlas and Obhi, 2013)) are easier to persuade. However, additional research must be conducted to substantiate the existence of the self-agency paradox.

We did not find the proposed direct effect of interactivity on impulse-visit urge and impulse-buying urge. A possible explanation for this is that interactivity could both and simultaneously have a negative and positive effect on impulse urges. It appears that the residual direct effect of interactivity on impulse visit urges and impulse buying urges, when taking self-agency into account, turns out to be negative in two out of three of our experiments (Experiment 1^{buying}: $B = -0.69$, $SE = 0.30$, 95% CI: $[-1.29$ to $-0.09]$, $p = 0.025$; Experiment 2a^{visit}: $B = -0.54$, $SE = 0.27$, CI: $[-1.07$ to $-0.01]$, $p = 0.046$; Experiment 2a^{buying}: $B = -0.62$, $SE = 0.23$, 95% CI: $[-1.06$ to $-0.17]$, $p = 0.007$). This means that two processes could be triggered by interactivity that cancel each other out, whereof self-agency is the process that explains the positive effect of interactivity. Future studies should examine the possible mediators that could explain the negative effect of interactivity, such as involvement (see Liu and Shrum, 2013).

Implications for practice

This study provides practical contributions to professionals working in the retail, marketing and advertising fields. We gained more relevant and externally valid information for retailers that run a physical store by conducting field experiments. Hereby, this study explicitly distinguished impulse-visit urges from impulse-buying urges. We proposed that impulse visits are a manifestation of experiential shopping motives and behavior while impulse purchases would pertain to more materialistic motives and behavior. Since (impulsive) store visits do not necessarily lead to (impulsive) purchases and vice versa, it is interesting for interactive marketing practitioners to explicitly make this distinction.

It is relevant to know that interactive screens in store-windows *could* increase the number of people who visit their store spontaneously and buy something there impulsively, depending on whether feelings of self-agency are nourished. This insight is important as physical stores are increasingly dependent on impulse visits and impulse purchases (Mehra *et al.*, 2017). Interactive screens are already used in physical stores (Pantano, 2016). However,

except for one qualitative study that suggests that interactive screens could strengthen physical stores' competitive position (Pantano, 2016), no research was conducted on the actual effects of these kinds of screens. The use of interactive screens in storefronts of high-end clothing stores could be beneficial for retailers *if* the screens stimulate a sense of self-agency with the user, resulting in impulse visits and impulse purchases.

Limitations and future research directions

Although this study contributed to the literature and practice in multiple ways, it entails some critical limitations. First, it evaluates urges rather than actual behaviors. Measuring impulse behavior is challenging as it is difficult to observe whether a behavior is impulsive. Studies on impulse-buying behavior (e.g. Mohan *et al.*, 2013) often approach people who already bought something and then *afterward* ask if these purchases were planned (vs unplanned) and whether or not the purchase process was accompanied by a sudden strong urge or desire to buy the product. The disadvantage of this method is that it possibly leads to incorrect answers of the respondents since they are likely to justify their behavior (e.g. James and Rentsch, 2004) by, for example, falsely telling themselves and others they were already planning to buy the purchased item that was actually bought impulsively. Asking people about urges and desires can also be criticized when those urges have already been fulfilled with the product's purchase. We questioned participants just before a possible impulsive action was taken and asked about their current urges, making the results more valid. However, the consequences were that we could not observe their visiting and buying behavior afterward, as we had already made the participants aware of their urges, which arguably interferes with acting impulsively. Therefore, future research should focus on developing a new method to measure impulse-buying *behavior*. It would be also interesting to study the effect of online interactivity vs offline interactivity, to establish their relative effects on impulse urges and impulse behavior.

A second limitation of this study is the forced usage of the screens. In addition to the practical issue of needing enough passers-by to interact with the screen, we asked participants to use the screen to counter self-selection. External validity can be improved when passers-by are not explicitly asked to use the screen. Without forced usage, it is likely that more information-seeking passers-by would have used the screen (Qin, 2020), which may have affected the outcomes of the experiments. Future studies should consider only addressing passers-by who use interactive screens voluntarily, as this is a more natural shopping situation. Nevertheless, since this study only used field experiments, the external validity is relatively high (in comparison to lab experiments); the experiments were conducted in a real-life shopping street, the interactive screen was placed in an actual shop and all participants were real passers-by and were therefore not asked to visit but just to participate in the study. This makes this study highly valuable in both practice and science.

This study shows that interactivity (through interactive screens in store windows) can positively affect impulse visits and impulse purchases, if the underlying mechanism, "feelings of self-agency", is activated. This is an interesting and relevant insight that should be examined extensively. Therefore, we encourage other researchers to determine if they can replicate our findings in different settings, search for other mediators that may explain the positive (and possibly negative) effects and explore the role of possible moderators that could aggravate the effect of interactivity, such as consumer-brand identity (Graham and Wilder, 2020). This study can serve as a foundation for future research as it is the first to examine the effect of interactive screens in store windows on impulse urges. It is also the first to show that self-agency is an important explanation for the positive effects of interactivity.

Notes

1. <https://www.ecommercenews.nl/winkels-proberen-interactieve-touchscreens/>, retrieved 20 March 2019.

2. Since the Cronbach's alpha of the two-way communication scale and the synchronicity scale appeared to be insufficient in the first experiment, we proceeded the manipulation check analyses in Experiment 1 only with the active-control construct (Cronbach's alpha = 0.77). The low Cronbach's alpha for "two-way communication" and "synchronicity" were likely caused by the fact that many participants overlooked some of the items that measured two-way communication and synchronicity. Therefore, we made it mandatory in Experiments 2 and 3 to answer all manipulation-check questions.
3. The first author can be contacted for a full list of these explorative variables. We did not find any significant results of these explorative variables and will not mention these further in this study.
4. For exploratory purposes, we also included state mindfulness and private self-awareness in Experiment 2b to explore if these variables would explain a possible negative effect of interactivity on impulse-visit urges and on impulse-buying urges. Process' model nr 4 shows that both mindfulness and self-awareness did not function as a mediator in these effects.

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Appendix 1
Conceptual model

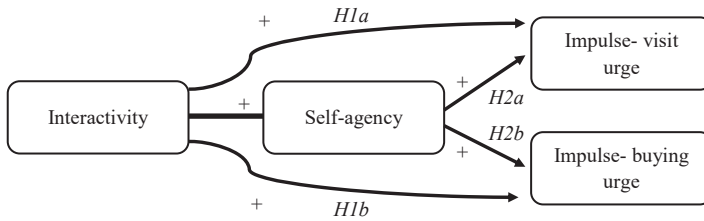


Figure A1.
Conceptual model
hypotheses

Appendix 2
Impression of the conditions



Plate A1.
Low-interactivity
condition after the
participant pressed
play, where levels of
control, two-way
communication and
synchronicity were
kept low



Plate A2.
High-interactivity
condition after the
participant pressed
play, where levels of
control, two-way
communication and
synchronicity were
higher

Appendix 3
Scale measurements and means

Construct	Items	Cronbach's alpha 1/2a/2b	Based on scales used by
Active control	I felt that I had control over the screen; While interacting with the screen, I could browse at my own pace; While interacting with the screen, I had absolutely no control over what I could do with the screen.*^	77/0.75/0.82	Liu and Shrum (2002)
Two-way communication	It is impossible to share my opinion via the screen*^; The screen makes me feel it wants to listen to its visitors; The screen gives visitors the opportunity to talk back	0.52/0.81/0.70	Liu and Shrum (2002)
Synchronicity	When I clicked on the screen, I felt I was getting an instantaneous response; The screen was very slow in responding to my requests.*^	0.37/0.75/0.83	Liu and Shrum (2002)
Overall perceived interactivity	On a scale from 1 (not at all) to 7 (very), how interactive did you find the screen?	-	-

Note(s): * Item was recoded in the analysis, ^ Item was deleted in at least one of the studies to increase the Cronbach's alpha

Table A1.
Measurements
manipulation checks
experiments 1, 2a
and 2b

Construct	Items	Explained variance 1/2a/ 2b	Cronbach's alpha 1/2a/2b	Based on scales used by
Impulse-buying urge	I feel a strong urge to buy (one of the) products that the screen displayed; I want (one of the) products that the screen displayed; I did not intend to buy (one of the) displayed products, but now I do feel the desire to do so	76.26%/ 70.23%/ 74.01%	0.84/0.79/0.82	Sultan <i>et al.</i> (2012)
Impulse-visit urge	I feel a strong urge to enter this store; I want to visit this store; I did not intent to visit this store, but now I feel the desire to do so	80.24%/ 73.40%/ 73.62%	88/0.82/0.82	Sultan <i>et al.</i> (2012)
Feelings of self-agency	It felt like I was responsible for what happened on the screen; It felt like I was the one influencing what happened on the screen	90.01%/ 95.32%/ 87.79%	0.96/0.91/0.86	Ruth <i>et al.</i> (2002)

Table A2.
Measurements key-
constructs experiments
1, 2a and 2b

Condition	SA	IVU	IBU
Low interactivity	Exp. 1: 1.88 (1.24)* Exp. 2a: 1.75 (1.15)* Exp. 2b: 2.06 (1.40)*	Exp. 1: 3.05 (1.58) Exp. 2a: 2.89 (1.56) Exp. 2b: 2.94 (1.64)	Exp. 1: 2.60 (1.48) Exp. 2a: 2.51 (1.37) Exp. 2b: 2.50 (1.35)
High interactivity	Exp. 1: 3.02 (1.53)* Exp. 2a: 3.54 (1.82)* Exp. 2b: 3.44 (1.84)*	Exp. 1: 3.15 (1.49) Exp. 2a: 2.67 (1.35) Exp. 2b: 3.18 (1.44)	Exp. 1: 2.28 (1.27) Exp. 2a: 2.34 (1.17) Exp. 2b: 2.88 (1.56)

Note(s): * Significant difference between low and high interactivity within the same Experiment

Table A3.
Means and standard
deviations of self-
agency, impulse-visit
urges and impulse-
buying urges in low
interactivity and high
interactivity conditions
per experiment

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