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Brands in virtual reality games: Affective processes within computer-mediated consumer experiences

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ABSTRACT

Virtual reality (VR) marketing is here to stay—or at least that is what is generally believed. Head-mounted display (HMD) VR hardware is rapidly becoming more accessible to the general public, and businesses have started adopting VR as an experiential marketing platform. In this study, we examine two affective mechanisms that play a role in the workings of branded VR games in an HMD VR context: (1) virtual product appeal and (2) emotional response. We conducted a between-subjects (branded VR game vs. non-branded VR game) lab experiment ($N = 81$) among young adults who were recruited via the university's lab recruitment system. During the experiment, participants used HTC Vive hardware with hand-held controllers. The results show that virtual product appeal strengthens the effect of brands in VR games on brand attitude. Moreover, brands in VR games elicit emotional responses, which subsequently drive brand attitude and purchase intention.

1. Introduction

At your foot you *see* the ball. You are in possession though several opposing players are blocking your way to the goal. You *hear* the stadium roaring in the background as you evade an opponent and *move* past him … all the while focusing your gaze on the ball and your feet. From the corner of your eye, you see that the goalkeeper is poorly positioned. You take a deep breath, aim, and shoot. It is a goal! The stadium goes wild and you *feel* amazing. Then everything goes black. Next, you see the shoes you were wearing, right in front of you—they are Nike shoes.

This is an outline of a person's experience when playing the popular virtual reality (VR) game 'The Neymar Jr. Effect'. In this game, a player is immersed in a multi-sensory VR experience and takes the perspective of a soccer player who scores a goal all the while wearing a pair of Nike shoes (AdAge, 2015). It is a gamified consumer experience designed by the sports brand Nike to promote their shoes and an example of a branded VR game.

An increasing number of companies currently use VR marketing practices such as branded VR games to promote their business (Boyd & Koles, 2019; Jung & Tom Dieck, 2017). In their recent review of the VR-marketing literature, Alcañiz, Guixeres, and Bigné (2019) suggest that VR marketing is particularly effective because of its ability to enrich consumer experiences. Flavián, Ibáñez-Sánchez, and Orús (2019) further conceptualize the enhancing nature of VR by integrating it into the consumer hierarchy framework. This framework, which was originally proposed by Neuhofer, Buhalis, and Ladkin (2014), postulates that technology can be used to enhance 'consumer core experiences' (e.g., product appraisal, store visits) and render more valuable consumer experiences.

These enhancements are technology-dependent. For example, head-mounted display (HMD) VR technology is believed to enhance consumer experiences by allowing for technological embodiment and real-world-like interactivity (Flavián et al., 2019). By wearing a HMD VR headset, users can look around in a 360° angle and interact with objects in the virtual space similar to how they would in base reality. Interestingly, despite these technological advancements, Alcañiz et al. (2019) recently identified that most VR studies still use less immersive VR interfaces with limited virtual affordances (e.g., 360° video & screen-based VR). This is viewed as a problem because it could significantly compromise experimental conclusions concerning the workings of modern VR. In response, they call for studies using highly-immersive HMD VR interfaces when investigating how VR technology can simulate and enrich core consumer experiences.

The purpose of this study is thus to investigate how HMD VR technology can enhance consumer experiences in the context of gamified VR advertising. We consider two affective mechanisms that could play a

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role in the workings of branded VR games: (1) virtual product appeal and (2) emotional response. First, we focus on the role of virtual products in branded VR games. Drawing on consumer learning theory, we test whether players' appeal of a embedded virtual product strengthens the effect of brands in VR games on brand attitude and purchase intention. Second, we will redirect our focus toward the embedded brand. By considering insights from the brand-engagement literature, we explore whether brands in VR games elicit a unique emotional response and whether this emotional response is ultimately carried over to the brand. In sum, this study will contribute to the contemporary understanding of VR as a marketing platform and offers valuable insights into how VR technology can enrich core consumer experiences.

2. Theoretical framework

2.1. Virtual reality as experiential marketing platform

Virtual reality is believed to be an ideal platform for experiential marketing (Loureiro, Guerreiro, Eloy, Langaro, & Panchapakesan, 2019) because the technology can enhance consumer experiences (Jung, Tom Dieck, Lee, & Chung, 2016). Empirical evidence from contemporary VR marketing research seems to support the notion that VR marketing is generally effective. For example, Tussyadiah, Wang, Jung, and Tom Dieck (2018) studied the application of VR marketing in a tourism context and found positive effects on consumers' attitudes and behavioral intentions. Similar results were found by Wang and Chen (2019) who reported that product placements in VR videos drives interest in the product's brand and purchase intention. In a different study, Martínez-Navarro, Bigné, Guixeres, Alcañiz, and Torrecilla (2019) showed a positive effect on brand recall and purchase intention when examining the use of VR in an e-commerce context.

2.2. Consumer-product interactions in HMD VR

A simulated consumer experience that is often integrated into branded games is the consumer-product interaction. By integrating the interaction with a virtual representation of a product into the gameplay, a consumer is prompted into interacting with the product in a playful way. These consumer-product interaction experiences offer the consumer more information about a product, which contributes to the consumers' overall experience with the product's brand, according to consumer learning theory (Hoch & Deighton, 1989). In other words, when consumers obtain new information from a consumer-product interaction, e.g., because they like the look of the product they interacted with, this is expected to update their personal evaluation of the product—and subsequently of the brand.

Early research into the process of consumer learning via interacting with virtual models of products was reported by Li, Daugherty, and Biocca (2003). They showed in an e-commerce context that the visual and affective evaluation of virtual product attributes affected brand attitude and purchase intent. In a different e-commerce study, Fiore and Jin (2003) demonstrated that using interactive features of virtual representations of clothing products evoked a sense of control, enjoyment, and involvement among users—this subsequently evoked approach behavior. In an e-commerce scenario however, the appraisal of the product could be considered more directly related to the task a consumer is performing (i.e., buying a product) when compared to the gamified advertising scenario considered here. In a gamified advertising context, the appraisal of the product is integrated into the gameplay and is thus more subtle.

Also, due to technological advancements, both the quality of the virtual products as well as the interfaces that allows for the interaction with virtual products have changed considerably over the past two decades (Alcañiz et al., 2019). Currently, photorealistic virtual products can be integrated into VR applications relatively easily, which allows players to interact with a hyper-realistic virtual model of a product (Petit, Velasco, & Spence, 2019). Moreover, where desktop-based VR studies allowed consumers to interact with virtual products by using a keyboard or a computer mouse to rotate the products, HMD VR allows consumers to pick up the products and look at them from different angles in a more realistic manner using two hand-held controllers. This type of interaction mimics a real-world interaction with a product and is expected to facilitate consumer learning.

In sum, we expect the current technological affordances of HMD VR to facilitate consumer learning even though the appraisal of the virtual product is not directly related to the task that the consumer is performing (i.e., playing a branded VR game). We would expect that after playing a branded VR game that facilitates consumer-product interactions, players' evaluation of the embedded virtual product moderates the overall persuasiveness (i.e., brand attitude & purchase intent) of the branded game. More concretely, we expect players who evaluate the virtual product as more appealing will also likely evaluate the product's brand more positively and will be more likely to have the intention to purchase the product. Similarly, we would expect adverse brand effects when players evaluate the virtual product as less appealing. The following moderation hypothesis is proposed:

H1: Virtual product appeal strengthens the effects of brands in VR games on (a) brand attitude and (b) purchase intention.

2.3. Consumer-brand interactions in HMD VR

Another important factor that we believe explains the effectiveness of branded VR games is the technology-enhanced consumer-brand interaction. Grounded in the brand engagement literature is the notion that particular brands can evoke emotional responses (e.g., Smit, Bronner, & Tolboom, 2007). These responses are often expressed in terms of arousal and valence. According to Russel and Barrett (1999), these are the two main dimensions that define basic emotions. Arousal describes the degree of (neural) activation during an emotional response; valence is the degree to which this response is considered positive or negative.

According to Ahuvia (2005), emotional responses elicited by brands originate from the valenced and symbolic associations an individual has with this particular brand. These associations accumulate over time, which means that popular brands—or brands that people have had many encounters with in the past—tend to elicit stronger emotional responses (Maxian, Bradley, Wise, & Toulouse, 2013). These brands are ultimately expected to drive consumer behavior through the idiosyncratic value that they offer consumers (Kühn, Langner, & Fischer, 2013).

When embedded into an HMD VR environment, we expect the emotional responses to such brands to be more salient. In a non-commercial context, Riva et al. (2007) showed that the immersive experience of VR can enhance people's emotional response toward content presented in HMD VR and vice versa. By extrapolating the findings by Riva et al. (2007) to a commercial context, we expect brands in HMD VR games to evoke emotional responses independent of an individual's emotional response to the VR game. In other words, we expect to find enhanced levels of arousal and valence for people who play a branded VR game versus people who play a non-branded VR game. We propose the following hypothesis:

H2: Brands in VR games elicit an emotional response.

2.4. Emotional response is attributed to consumer-brand interactions

These enhanced levels of emotional response are elicited by consumer-brand interaction and are expected to positively affect consumers' brand responses. In other words, the enhanced emotional experience is believed to increase consumers' perceived hedonic value of the brand and subsequently their idiosyncratic overall evaluation of the brand. These expectations are in line with findings by Fiore, Jin, and Kim (2005). They showed that emotional responses to commercial stimuli positively affected purchase intention of website users in an

online shopping context.

Drawing from the emotional response literature, we use direct affect transfer and excitation transfer (Mitchell & Nelson, 2018) to explain the expected mediating role of emotional response. Both mechanisms are grounded in the notion that any hedonic value contained within an emotional response can be transferred onto a stimulus, which is the brand in our case. Direct affect transfer suggests that people attribute the pleasure they experience at least partially to the stimulus brand, and excitation transfer suggests that people will attribute some of the arousal they experience to the stimulus brand. In sum, we expect that the emotional response elicited by a brand in a HMD VR game drives overall brand attitude and purchase intention of the embedded brand. The following mediation hypothesis is proposed:

H3: Emotional response mediates the effects of brands in VR games on (a) brand attitude and (b) purchase intention.

2.5. Conceptual framework

A visual overview of our conceptual framework is shown in Fig. 1.

3. Method

3.1. Participants and procedure

To test our hypotheses, we conducted a lab experiment ($N = 81$) with a single factor (branded VR game vs. non-branded VR game) between-subjects design. Virtual product appeal and emotional response were measured as additional independent variables. The participants were young adults (72.8% female) with an average age of 22.04 ($SD = 2.74$) years and were recruited via the university's lab recruitment system. To be eligible to join the study, participants had to be (i) between 18 and 30 years old and (ii) not allergic to peanuts. The latter requirement was included because participants were asked to taste chocolate during the experiment and that could contain traces of peanut. The study received ethical approval from the host university (registered under: 2018-PC-9033). The data we report in this study were collected during a larger VR project ($N = 202$) that included three additional experimental conditions and for which various other variables were measured. Neither the three additional conditions nor the other variables are discussed in this study.

To conceal the true aim of the study the participants were told (as a cover story) that they participated in two studies: one investigating factors that contribute to the perceived entertainment value of VR games and the other investigating the relationship between personality traits and responses to A-brands and B-brands (of chocolate). Supplementary disclosing information about the project can be found in the acknowledgement.

Upon entering the lab, the participants were asked for their informed consent after which they played a VR puzzle game for about 4 min (in seconds: $M = 218.06$, $SD = 61.58$) using an HTC Vive with two hand-held controllers; see Fig. 2 for a screenshot of the gameplay. After the participants finished the game, they were asked to participate in a 5-minute bogus taste-test and to complete a questionnaire measuring their brand responses, emotional response, and several control variables. After completing the study, the participants were compensated for

Fig. 2. Screenshot of the non-branded version of the VR game. In the branded version, the transparent outline (shown on the right) displayed a logo of a popular chocolate brand.

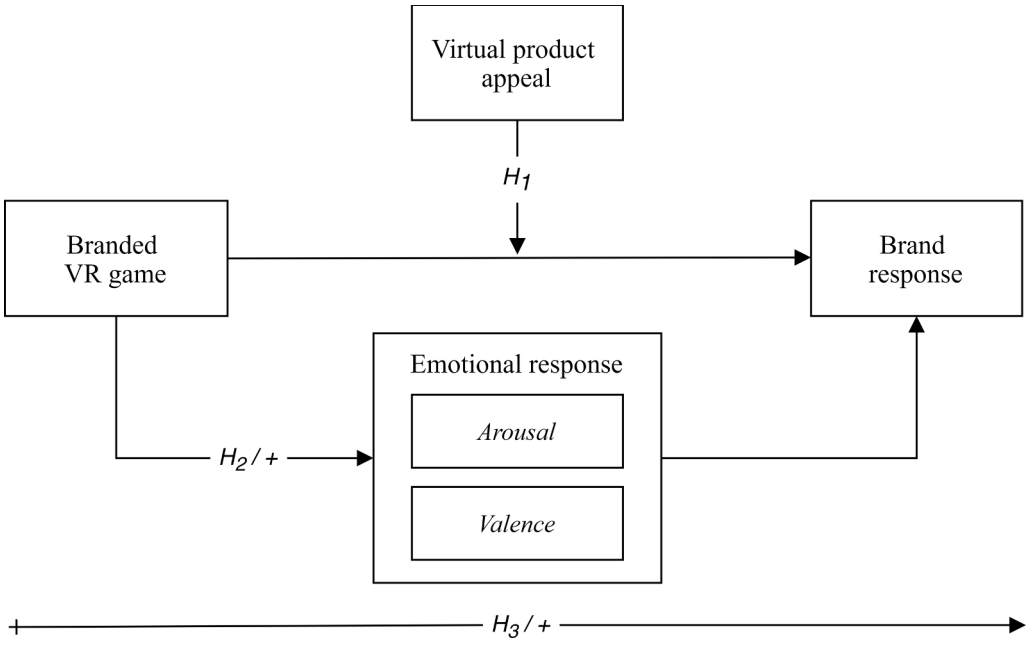

Fig. 1. Conceptual model.

their participation and subsequently debriefed about the true aim of the study.

3.2. Stimulus material

We used two versions of a VR game in this study. One version containing a brand (branded VR game) and another version containing no brand (non-branded VR game). The latter served as the control condition. To complete either version of the game, players had to finish three different Tangram puzzles (see Fig. 3). A Tangram puzzle is a Chinese puzzle consisting of seven pieces (called tans) that differ in size and shape. A set of seven tans can be used to build over 6,500 different 'pictures' (Slocum, 2007). In both VR games, we used pieces of virtual chocolate for tans that represented the product. With two hand-held controllers, participants were able to pick up the chocolate pieces from a table in front of them and drag them into an outline of the picture that they were completing. In the branded version of the game, the outline contained the logo of a chocolate brand, which means that it was prominently placed in the center of the participants' view. The non-branded version of the game served as the control condition, and the outline contained no brand. In both conditions, participants were forced to interact with the virtual product (i.e. the chocolate) in order to win the game—initiating consumer learning.

3.3. Pretest

To determine which brand to incorporate into the game, we conducted a pretest among 19 members of our target population. Following suggestions by Maxian et al. (2013), we aimed to select a target brand that is both popular and positively evaluated by our target population because that would increase the likelihood that our participants had at least some kind of relationship with the brand. Moreover, we aimed to find a confectionary brand as the target brand to improve the external validity of our study, because such brands often integrate advergames into their marketing mix (Woźniakowski, 2018).

During the pretest, each participant was shown ten popular chocolate brands and asked to indicate per brand whether they had (i) ever eaten this brand of chocolate before, and if so, on a 5-point scale, (ii) how likely they were to buy this brand. Afterwards they were asked to indicate on a 10-point scale (iii) how much they liked each of the brands. Based on these results, Milka was chosen as the target brand for the main study. All participants reported having eaten chocolate from Milka before (100%) and were somewhat likely to buy this brand ($M = 3.44$, $SD = 1.20$); they generally showed positive attitudes toward the brand ($M = 7.88$, $SD = 1.11$).

3.4. Measures

3.4.1. Brand responses

We considered two brand responses: brand attitude and purchase intention. First, brand attitude ($M = 5.47$, $SD = 0.98$) was measured using a six-item 7-point semantic differential scale (Bruner, 1998) ranging from 1 (i.e., 'bad', 'unappealing', 'unpleasant', 'unattractive', 'boring', 'dislike') to 7 ('good', 'appealing', 'pleasant', 'attractive', 'exciting', 'like'). The scale proved to be valid ($EV = 4.17$, $R^2 = 0.69$) and reliable (Cronbach's alpha = 0.91). Second, purchase intention ($M = 2.54$, $SD = 1.64$) was measured on a single-item 7-point scale ranging from 1 ('totally disagree') to 7 ('totally agree') by asking the participants to indicate how much they agreed with the statement "I am planning on buying Milka chocolate within the next seven days."

3.4.2. Virtual product appeal

We used two questions to measure virtual product appeal: 'How appealing was the chocolate you saw while playing the game?', 'How much did you feel like eating the chocolate?'. A two-item 7-point index scale was constructed ($M = 4.02$, $SD = 1.70$) that was both valid ($EV = 1.77$, $R^2 = 0.88$) and reliable ($r_{SB2} = 0.87$). Note that to determine the reliability of this scale we estimated a Spearman-Brown *split-half* reliability coefficient, rather than a Cronbach's alpha coefficient—as is recommended by Eisinga, Grotenhuis, and Pelzer (2013) for constructing two-item scales.

3.4.3. Emotional response

To determine people's emotional responses while playing the VR game, we used self-assessment manikin (SAM) scales (Bradley & Lang, 1994) for arousal and valence. For this self-reported measure of emotional response, participants were shown a row of five manikins per emotional dimension that differed in the level of arousal or valence they portrayed. For the scale measuring arousal, the first manikin seemed very calm, but the final one seemed very excited. Similarly, for the scale measuring valence, the first manikin seemed very sad, and the final one seemed very happy. The participants were asked to indicate their emotional state while playing the VR game on a 9-point response scale. Each odd number of the scale corresponded with one of the five manikins for arousal ($M = 5.20$, $SD = 1.65$) and valence ($M = 7.49$, $SD = 1.06$).

3.4.4. Control variables and demographics

Three control variables were considered for this study in addition to age and biological sex: perceived entertaining value of the game, game difficulty, and prior brand use. Perceived entertaining value of the game ($M = 5.87$, $SD = 0.89$) was measured using a four-item 7-point scale (Martí-Parreño, Aldás-Manzano, Currás-Pérez, & Sánchez-García, 2013; e.g., 'Playing the game has been enjoyable', 'I had fun playing the game') because perceived enjoyment has been found to be associated with purchase intention in a VR context (Manis & Choi, 2019). The scale proved to be both valid ($EV = 3.01$, $R^2 = 0.75$) and reliable (Cronbach's alpha = 0.87). Game difficulty ($M = 2.76$, $SD = 0.82$) was measured using with a four-item (e.g., 'To what extent did you find the game easy', 'How well do you think you performed in the game?') 7-point scale because it is believed to be a strong predictor of players' levels of arousal and valence while playing games (Gabana, Tokarchuk, Hannon, &

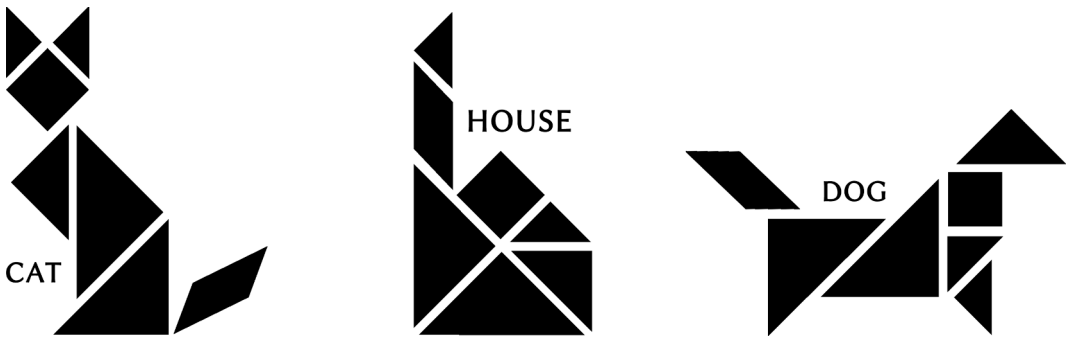

Fig. 3. Tangram puzzles that were included in the VR game.

Gunes, 2017). This scale was both valid ($EV = 2.07$, $R^2 = 0.52$) and reliable (Cronbach's alpha = 0.68). Finally, we measured prior brand use ($M = 2.57$, $SD = 1.27$) on a single-item scale ranging from 1 (*never*) to 7 (*often*) in terms of how often they purchase the target brand. Studies into gamified branded content show that previous experience with a brand can affect future brand responses (Van Reijmersdal, Jansz, Peters, & Van Noort, 2010).

4. Results

4.1. Randomization check

To first check whether the sample data were distributed equally across conditions, we performed a randomization check with several variables. We compared the mean scores between conditions for age, t (79) = −1.12, $p = .312$; entertainment, t (79) = −1.82, $p = .072$; game difficulty, t (79) = −0.10, $p = .919$; and prior brand use, t (79) = −0.30, $p = .767$. Furthermore, a chi-square test statistic compared the distribution of biological sex ($\chi^2 = 0.00$, $p = .946$) between conditions. These results show no irregularities and suggest that the random assignment of participants across both conditions was performed successfully.

4.2. Main analyses

To facilitate the interpretation of the moderation and mediation models used to test the hypotheses, we displayed mean and standard deviation estimates (per experimental condition) for the dependent variables brand attitude and purchase intention and both dimensions of the mediator variable emotional response (i.e., arousal and valence) in Table 1.

4.2.1. Virtual product appeal as a moderator

To test Hypothesis 1, we estimated two analysis of variance models—one with brand attitude as dependent variable and the other with purchase intention as dependent variable. For both models, the experimental condition was considered an independent variable and virtual product appeal was a moderator. The results revealed a significant interaction effect on brand attitude, F (1, 75) = 5.24, $p = .025$, 95% CI [0.04, 0.55], $\eta_p^2 = 0.07$, but not on purchase intention, F (2, 74) = 0.83, $p = .577$, 95% CI [−0.32, 0.56]. This implies that virtual product appeal only strengthens the effect of brands in VR games on brand attitude, but not on purchase intention. For a visualization of the moderating effect of virtual product appeal on the effect of brands in VR games on brand attitude see Fig. 4.

We applied the Johnson-Neyman technique to facilitate the interpretation of the significant moderation model. We found that when virtual product appeal fell below 3.21, participants in the branded VR game condition would report significantly lower brand attitudes than in the control condition. The value corresponded with a virtual product appeal value of about a half ($z = -0.48$), which is a standard deviation below average. The results indicate that after playing a VR game that facilitates virtual consumer-product interactions, people who consider the embedded virtual product to be less appealing will generally evaluate the product's brand less positively when this brand is also integrated into the game than when this brand is not integrated into the game (Fig. 4). Note that the data does not show any differences between the two conditions for people that reported higher virtual product appeal. In sum, we expected virtual product appeal to moderate both the effects of playing branded VR games on brand attitude (H1a) and purchase intention (H1b); however the data only supports Hypothesis 1a. Hypothesis 1b is rejected.

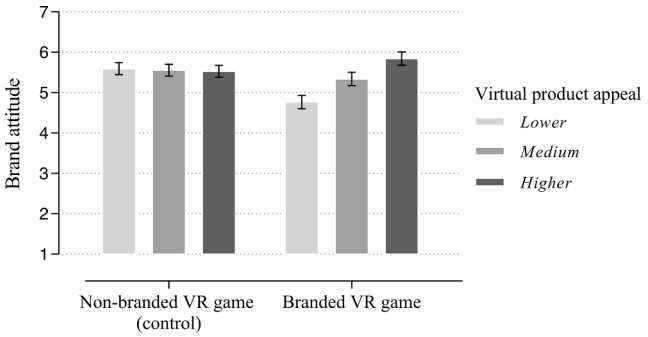

Fig. 4. Brand attitude scores across different levels of virtual product appeal. The three levels correspond with the 16th (*Lower*), 50th (*Medium*), and 84th (*Higher*) percentiles of virtual product appeal—respectively being 2.02, 4.09, and 5.92 on a seven-point scale. Only for participants who reported lower virtual product appeal, the differences in brand attitude scores across the two conditions was significant ($p < .012$). The error bars shown in the figure are estimates of the standard error of the mean (SEM).

4.2.2. Consumer-brand interaction and emotional response

To test Hypothesis 2, we estimated a one-way MANOVA with the experimental condition as independent variable and both arousal and valence as dependent variables. We used the Wilk's Lambda test statistic to interpret the multivariate results because no significant differences were found between the covariance matrices of the experimental and control conditions (Box's $M = 7.66$, $p = .059$).

The multivariate results were significant, Wilk's Lambda = 0.87, F (2, 78) = 5.83, $p = .004$, multivariate $\eta^2 = 0.13$, which implies that playing the branded VR game resulted in stronger emotional responses than playing the VR control game (see Table 1 for descriptive information). The univariate results revealed that people playing the branded VR game experienced significantly higher levels of arousal than those playing the VR control game, F (2, 79) = 9.79, $p = .002$, 95% CI [−1.79, −0.40], $\eta_p^2 = 0.11$. We found similar differences for valence, F (2, 79) = 4.82, $p = .031$, 95% CI [−0.51, −0.05], $\eta_p^2 = 0.06$, between the branded VR game and VR control game. The data is in support of Hypothesis 2 and indicates that people who played the branded VR game experienced stronger emotional responses than people playing the non-branded VR game in terms of both arousal and valence.

4.2.3. Emotional response as a mediator

To test Hypotheses 3, we estimated two multiple mediator models (Preacher & Hayes, 2008) using PROCESS (Hayes, 2013; Model 4) with the experimental condition as independent variable and arousal and valence as parallel mediator variables. Brand attitude was included in the first model as a dependent variable, and purchase intention was considered in the second one. Both models were estimated with heteroscedasticity-consistent standard errors and covariance matrix estimators (HC3) and 95% confidence intervals (10.000 bootstrap samples). The use of HC3 estimators (instead of no correction or HC1/HC2 estimators) was suggested by Long and Ervin (2000) and re-iterated by Hayes and Cai (2007) to control for potential heteroscedasticity in the estimations.

The results shown in Table 2 indicate that emotional response

Table 1
Means and standard deviation estimates of key variables per experimental condition.

	Non-branded VR game (control)		Branded VR game				
	M	*SD*	*M*	*SD*	*t*	*df*	Cohen's *d*
Brand attitude	5.52	0.94	5.41	1.03	−0.50	79	–
Purchase intention	2.63	1.62	2.45	1.66	−0.49	79	–
Arousal	4.66	1.51	5.75	1.63	**3.13**	79	0.69
Valence	7.24	1.16	7.75	0.90	**2.20**	79	0.49

Note. *t*-statistics in bold are significant.

mediates the effect of consumer-brand interaction on the persuasiveness of branded VR games in terms of both brand attitude and purchase intention. In line with our expectations, we found that the total indirect effect of emotional response (arousal and valence combined) positively influenced brand attitude ($b = 0.20$, 95% CI [0.02, 0.45]) and purchase intention ($b = 0.20$, 95% CI [0.04, 0.43]). These data support Hypothesis 3.

5. Discussion

The purpose of this study was to investigate how HMD VR technology can enhance consumer experiences in a gamified VR advertising context. We considered two affective mechanisms that we expected to play a role in the workings of branded VR games: (1) virtual product appeal and (2) emotional response. In line with our expectations, we found evidence for the moderating role of virtual product appeal in the effect of playing advergames on brand attitude. We further found that the players' emotional responses that can be attributed to the embedded brand serve as a mediator and partially explain the effectiveness of branded VR games. Overall, we can draw three conclusions.

5.1. Virtual product appeal as moderator

We first found that virtual product appeal moderates the effect of playing branded VR games on brand attitude for games that have virtual products integrated into the gameplay. In line with consumer learning theory (Hoch & Deighton, 1989), our results demonstrate that virtual product appeal modulates brand attitude in the branded VR game condition—and, as expected, not in the control condition. However, we did not find a moderation effect for virtual product appeal on purchase intention.

5.2. Emotional response as mediator

The second conclusion is that consumer-brand interactions in HMD VR can evoke emotional responses in terms of both arousal and valence. Moreover, our third conclusion reads that the emotional response attributed to the consumer-brand interaction while playing a branded VR game drives both brand attitude and purchase intention. These findings are an extension of the work by Riva et al. (2007) who showed in a non-commercial context that HMD VR technology enhances emotional responses to content presented in this medium. This effect can be explained by considering that increased emotional responses drive a person's perceived hedonic value of the brand, which in turn drives consumers' commercial behavior.

5.3. Limitations and suggestions for future research

This study offers several new insights into the working of branded content in a HMD VR environment, but there are a few considerations and limitations that should be considered. First, within the current study design, we measured virtual product appeal as an additional independent variable rather than that being manipulated. By not manipulating virtual product appeal, we cannot attribute causality to the moderating relationship of virtual product appeal and have to interpret the results as correlational evidence. To examine the causal impact of virtual product appeal, in a HMD VR context, we suggest follow-up research to manipulate specific attributes of an embedded virtual product, e.g., the image quality of the virtual product.

Second, the context in which the role of virtual product appeal was investigated could have affected the outcomes. In our study, consumers interacted with the virtual products in order to win the game. However, the appraisal of the virtual products was not the primary cognitive task that was being performed by the consumer because their focus was required to play the game. This differs from a more traditional consumer learning situation in which the appraisal of a product is often the consumer's main cognitive task. Thus, it is plausible that the experiment would have rendered different results if the HMD VR experience would have been a traditional consumer learning situation such as a shopping experience. Therefore, future research should explore whether the findings of the current study corroborate with different consumer learning situations as simulated in HMD VR.

Third, this study relied on self-reported measures of emotional response. Here, Reimann, Castaño, Zaichkowsky, and Bechara (2012) demonstrated that self-reported measures of arousal and valence are generally satisfactory measures for emotional response. They indicated that self-reported measures tend to be less sensitive than physiological ones and might thus distort the effect size of the actual emotional response that is being experienced. To validate our findings, future research could use physiological measures to examine the indirect role of emotional response in the effectiveness of branded VR games. Physiological measures that could be considered are skin-conductance, heart-rate variability (e.g., Gangadharbatla, Bradley, & Wise, 2013; Reimann et al., 2012), and fMRI (e.g., Reimann et al., 2012).

5.4. Implications for theory and practice

5.4.1. Theoretical implications

This study offers several important theoretical and managerial implications. First, for theory, the current study demonstrates that HMD VR technology allows for product appraisal outside a traditional consumer learning context. Our work builds on Li et al. (2003) and Fiore and Jin (2003) by demonstrating that consumer learning processes can

Table 2
Direct and indirect effects mediation models.

Emotional response		Arousal					Valence				
Direct effects		*b*	*SE*	*t*	*p*	95% CI	*b*	*SE*	*t*	*p*	95% CI
Branded VR game		**1.09**	0.35	4.09	.003	0.39, 1.80	**0.51**	0.23	2.17	.033	0.04, 0.97
Brand responses		Brand attitude					Purchase intention				
Direct effects		*b*	*SE*	*t*	*p*	95% CI	*b*	*SE*	*t*	*p*	95% CI
Branded VR game		−0.30	0.21	−1.42	.160	−0.73, 0.12	−0.52	0.39	−1.34	.183	−1.29, 0.25
Arousal		0.07	0.07	1.05	.299	−0.07, 0.21	0.21	0.11	1.96	.053	−0.00, 0.43
Valence		**0.23**	0.11	2.06	.043	0.01, 0.45	0.20	0.19	1.06	.294	−0.18, 0.57
Indirect effects		*b*	*SE*	*t*	*p*	95% CI	*b*	*SE*	*t*	*p*	95% CI
Emotional response	Arousal	0.08	0.09	–	–	−0.06, 0.29	0.14	0.10	–	–	−0.01, 0.37
	Valence	0.12	0.08	–	–	−0.00, 0.29	0.06	0.07	–	–	−0.05, 0.21
	Total	**0.20**	0.12	–	–	0.02, 0.45	**0.20**	0.10	–	–	0.04, 0.43

Note. Regression coefficients in bold are significant.

be facilitated within a gamified HMD VR environment. Their studies, like most studies that apply consumer learning theory (Hoch & Deighton, 1989), investigated product appraisal in contexts directly or closely related to purchasing or product choice behavior (e.g., e-commerce situations, store visits). In conclusion, it seems like HMD VR experiences do not necessarily have to mimic real-world shopping situations to allow for virtual product appraisal.

Second, our study is the first to show that brands in HMD VR environments can elicit clear emotional responses independent of the emotional response elicited by playing the VR game. Most studies examining emotional responses to brands have been conducted in controlled settings, which means that the current study contributes to the literature by showing that brands can also elicit an emotional response whenever they are embedded in an already emotion-eliciting context. Furthermore, these findings suggest that when studying the effects of branded VR games, one should consider that both the brand and the game can elicit an emotional response from consumers independent of each other. Note that this could have consequences for the interpretation of effects of branded VR games whenever the study design does not allow for a differentiation between emotional response elicited by the game and emotional response elicited by the brand.

5.4.2. Managerial implications

Finally, we outlined two implications for marketing managers interested in investing in VR marketing for experiential purposes. First, to avoid adverse brand effects, our findings suggest that when integrating virtual products into branded VR games—like in the Nike example (AdAge, 2015) from our opening paragraph—it is important that players finds them appealing. Moreover, when the general evaluation of a target brand is already very positive, including virtual products might not be advised. A lower virtual product appeal might result in less positive brand evaluation.

Second, our results imply that for brands that tend to elicit emotional response from consumers, HMD VR marketing maybe be advantageous. When people play branded VR games, the technology-enhanced consumer-brand interactions are found to inflate the hedonic value of the brand—this subsequently leads to more positive brand attitudes. In summary, we found that HMD VR technology can enrich core consumer experiences by allowing for virtual product appraisal in a gamified context and by increasing a consumer's overall perceived value of a brand by transferring its strengthened emotional response.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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