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First-Person Experience in Virtual Reality Sport Advertisements: Transportation of Embodied Empathy

Abstract

Virtual reality (VR) has emerged as a powerful marketing tool by eliciting novel and enjoyable consumer experiences. To help shape the future of sport advertisements and influence consumers' purchasing decisions, this study aims to investigate the effects of sport advertisements implemented with VR. Drawing on embodiment theory and transportation theory, we (1) conceptualized embodied empathy according to VR context and (2) examined a model involving psychological processes of embodied empathy, a sense of presence, and attitudes. The results showed that the effect of embodied empathy on consumers' attitude toward brand is mediated by a sense of presence and the attitude toward the advertisement, in a causal sequence. This study contributes in several ways to our understanding of VR in sport advertisements and suggests important practical implications.

I Introduction

Virtual reality (VR) is emerging as a powerful platform to reach distant sport consumers, away from where a physical experience takes place (Lee et al., 2021; Kent et al., 2019). As VR devices become more accessible to consumers at an affordable price, sport marketers are actively employing VR technology to reach a wider audience (Spielmann & Orth, 2021; Uhm et al., 2023), with an estimated \$1.8 billion spent globally on VR advertisements in the sports industry in 2023 (Statista, 2023). Using this innovative platform, marketers are advertising their products or brands to consumers in a way that they have never experienced before (Kim & Ko, 2019). VR sport advertisement involves promoting products and brands related to sports through endorsers, utilizing realistic virtual technologies, to connect with consumers and enhance brand visibility. For example, Gatorade has created an interactive VR football advertisement called "Beat the Blitz 360 Degrees," which physically engages consumers while advertising their sport drink products by virtually showing how dehydration negatively impacts the body while exercising.

A unique feature of VR is that it allows viewers to experience other viewpoints with a first-person perspective. Through VR, viewers can feel others' emotions and empathize strongly with the characters presented (Shin, 2018). This empathy is considered a vital factor in advertisement studies as it prompts

viewers to have a positive attitude towards the relevant advertisement and brand (Escalas & Stern, 2003). Empathy has also attracted scholarly attention in the VR literature as an antecedent to the sense of presence, which is one of the significant factors that indicate how much the audience is absorbed and transported to virtual environment (Bachen et al., 2016). However, empirical evidence is scarce on how these cognitive/affective constructs are involved in information processing for persuasion in the context of both VR advertisements and, more particularly, VR sport advertisements.

In general, sport advertisements induce positive emotions such as vicarious satisfaction and achievement through their portrayal of athlete's dynamic and professional movements (Uhm et al., 2017). A lingering question is how sport advertisements using VR can provide effective persuasive power to sport consumers. More specifically, little is known how consumers indirectly experience the movements and emotions of athletes through VR advertisement and thus empathize with them, and how this process affects their attitude toward sport advertisements or brands. Despite its positive prospect, the need for an academic understanding of the effects of VR sport advertisement has been neglected. Addressing these research questions will make a significant contribution both practically and academically for better understanding consumers at a time when VR technology is increasingly being employed in sport advertisements.

The purpose of the current study is twofold. First, in the midst of active debate among scholars about how empathy originates in the virtual setting, this study aims to provide conceptual understanding of how empathy can be engendered in VR sport advertisements based on embodiment theory. Also, this study aims to shed light on the relationship between empathy, a sense of presence, and attitude toward advertisements and brands to identify how VR sport advertisement viewers process the persuasive information based on transportation theory. Drawing on these theories, we expect to contribute to the existing body of VR literature. In expanding our understanding of empathy and the sense of presence as it arises from a virtual environment, we focus on VR sport advertisements that have scarcely been researched. We

also provide practical implications by suggesting which factors can be highlighted to enhance the effectiveness of VR sport advertisements.

2 Literature Review

VR technologies have been developed to pursue innovative ways to achieve success in various fields. With the launch of commercial VR devices, such technologies have been widely applied to industries such as retail (Lau & Lee, 2019), healthcare (Liang et al., 2021), film (Mateer, 2017), education (Fussell & Truong, 2022), games (Cao et al., 2020), sport (Uhm et al. 2020), and advertisements (VanKerrebroeck et al., 2017). While the leverage of VR varies widely according to the field, practitioners acknowledge that VR is empowering paradigm shifts in each field. As such, VR technologies are set to revolutionize various industries and prove their mettle.

As practitioners have continued to utilize VR technologies in their respective fields, vigorous research efforts have been inspired by the effects of VR. The advertisement field is no exception. Research suggests that VR can be an effective advertising platform based on its strong interaction feature. For instance, VR allows consumers to scan and experience products or brands in a virtual environment, while immersing them in a particular landscape (VanKerrebroeck et al., 2017). Also, due to its immersive nature, VR advertisements can provide a much richer, interactive engagement along with a more novel experience than traditional advertisements (e.g., TV commercials and printed advertisements) (DeGauquier et al. 2019). Considering all of this evidence, it implies that VR can facilitate the transfer of hedonistic benefits to consumers by taking sport advertisement to a whole new level.

While many studies have suggested that advertisements utilizing VR technology is effective, little is known about the effectiveness of VR combined with sport advertisements. In sport advertisements utilizing VR, consumers can indirectly and vividly experience the dynamic movements of athletes, a feat that would otherwise prove difficult to achieve. This is different in nature

from advertisements for other general products, where consumers can merely explore the product in more than one way. Therefore, it is necessary to investigate the advertising effects according to VR's unique characteristics in the context of sport advertisements. Based on embodiment theory and transportation theory, the current study attempts to dissect the advertising effect that consumers experience when VR sport advertisements allow them to indirectly achieve their goal, from the viewpoint of an athlete.

3 Theoretical Background and Hypothesis Development

3.1 Embodiment Theory

Describing the relations between body and mind, the embodiment theory has emerged as a leading contemporary framework in consumer research (Stevens et al., 2019). Derived from cognitive neuroscience, this concept describes how persons experience themselves inside a body as it engages continuously with the environment (Lee et al., 2020; Matamala-Gomez et al., 2019). More specifically, in this theory, embodiment refers to the sense of possessing a body (Gallagher & Cole, 1995), and the human brain attempts to control and regulate the body by generating its own simulation of the body in the psychological environment (Riva et al., 2019).

According to previous studies on embodiment theory, the embodiment, as a construct, allows one to comprehend how they perceive themselves as a person and how their minds communicate with their bodies (Wiederhold, 2020). Specifically, the embodiment theory has been recently applied to understand how emotional information is processed within VR contexts by providing the means to identify and interpret the psychological factors in virtual environments (e.g., Bertrand et al., 2018). The VR platform generates a simulation of a body within the bounds of the virtual space, with VR replacing our physical bodies with virtual ones (Slater et al., 2010). Using a VR platform, viewers can become another entity and it is possible to elicit the perception

of having an appendage or an entire body that does not align with the viewer's perception of their physical body (Slater et al., 2010). As such, VR itself is an embodied simulation and it is considered a suitable instrument for studying embodiment. A growing body of research is investigating the use of VR in generating new approaches to augmenting, structuring, and replacing the experience of the user's body to better understand the mechanism of embodied cognition or emotion (Kilteni et al., 2012).

From a theoretical perspective, by enabling viewers to experience the dramatically enhanced movements of athletes, VR sport advertisement provides a more visceral understanding of embodiment. VR sport advertising can completely immerse a viewer by providing a range of sensory stimuli, making it the ideal content for recreating embodied experiences. In particular, it has been suggested that VR can be a powerful tool for eliciting and enhancing empathy in a consumer because it provides an embodied experience without having to engage their imagination (Wiederhold, 2020). Investigating whether these unique embodied experiences in VR sport advertisement create a sense of empathy with athletes will greatly contribute not only in the context of sport advertisement but also in the VR literature addressing embodiment theory. Thus, we attempt to conceptualize and provide evidence for how VR sport advertisement can generate embodied empathy based on embodiment theory.

3.2 Embodied Empathy

In the advertising field, empathy can be defined as the degree to which consumers experience the same emotional response to a message as the characters who provide that message in an advertisement (Escalas & Stern, 2003). The empathy that viewers experience from a first-person viewpoint in a VR environment offered by VR advertisements could be fundamentally different from the empathy they might experience from the third-person perspective provided by conventional media platforms (DeGauquier et al. 2019). As the viewers become the protagonist (i.e., athlete) in the VR sport advertisements, they can become the focus of empathy.

Moreover, as VR sport advertisements induce viewers' bodily movement and create an embodied experience, it can be approached from a different perspective than the empathy generated via conventional media. However, research on empathy in the context of VR sport advertisement is scarce and has not been conceptualized according to its context. We posit that empathy can be reconceptualized from the surrogate perspective of an athlete in a VR sport advertisement, rather than merely partitioning it into cognitive and emotional dimensions as previous studies have introduced. Given the unique nature of VR, we reconceptualized empathy according to the VR context, focusing on the relationship between a person and an empathetic virtual entity based on the social functionality of emotions conceptualized by Niedenthal and Brauer (2012).

We conceptualized embodied empathy in the context of VR sport advertisements according to three components: (1) empathetic understanding, (2) vicarious emotional response, and (3) identification. First, empathetic understanding can be a significant aspect of embodied empathy because individuals must first understand the emotions and mental states of virtual characters to empathize with them (Niedenthal & Brauer, 2012; Wiederhold, 2020). Second, vicarious emotional response occurs when an individual observes another person in an emotionally evocative situation even if that situation is not relevant to them (Niedenthal & Brauer, 2012). As VR sport advertisements provide dramatic and sensational scenes over a short time, vicarious emotional responses can be elicited, and in turn, lead to feelings of empathy for the athletes depicted in the advertisements. Third, identification occurs when the viewer identifies with a particular object in a VR environment. Niedenthal and Brauer (2012) argued that if an individual identifies with a particular entity, they can experience emotions on behalf of or from the standpoint of that entity. In the same sense, when an individual identifies with an athlete and experiences their performance and perceptions vicariously, they can strongly empathize with that athlete. Taken together, we propose empathetic understanding, vicarious emotional response, and identification as the components of embodied empathy in VR sport advertisements.

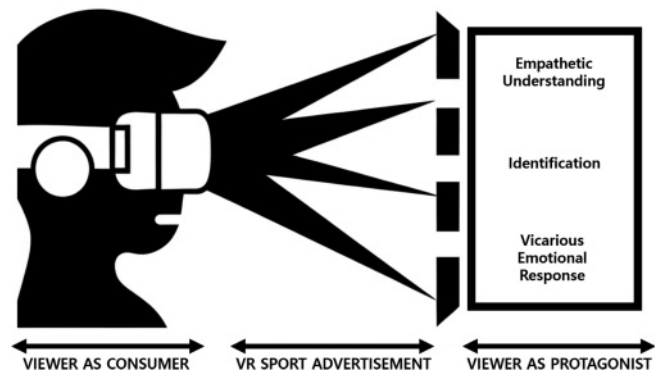


Figure 1. Conceptualization of embodied empathy.

In a VR setting, viewers can experience the movements of virtual existence (e.g., athletes in VR sport advertisements) from a first-person point of view on a proxy basis and identify with that existence. In addition, VR advertisements induce viewers to move their bodies, allowing them to experience embodied empathy. That is, this embodied empathy is an exclusive experience which viewers encounter from the perspective of the protagonist in the VR sport advertisement, and can evoke various cognitive and affective responses. This immediate immersion of viewers as protagonists in the virtual environment can obscure the conventional demarcations among empathetic components. As illustrated in the Figure 1, we posit that such rapid acknowledgment fosters concurrent engagement with Empathetic Understanding, Identification, and Vicarious Emotional Response, facilitating a dynamic interplay of empathetic experiences.

3.3 Transportation Theory

Transportation theory explains the phenomenon in which an individual identifies with a protagonist and is immersed in a narrative's environment, with positive results such as persuasion and positive emotions. Based on transportation theory, this study investigates how viewers' empathy evoked by sport advertisements is transported to the virtual environment, and how it affects viewers' attitudes.

Transportation theory underscores the narrative's significance as an instrument for transporting the reader's

mind to a different time and place (Green & Brock, 2002). It is the process by which readers become immersed in a narrative, causing them to lose any sense of time or the events occurring around them (Green et al., 2004). As a construct, transportation is a distinct mental process that fuses attention, imagery, and feelings resulting from profound concentration on a narrative (Green & Brock, 2002; Green et al., 2004). Importantly, although Green and Brock (2002) heavily derive their ideas from the print or narrative tradition, they contend that transportation surpasses the reading of written content. Narrative worlds are generally defined in terms of modality; the term “reader” can be understood to include viewers, listeners, or any consumers of media information. Indeed, transportation has recently been utilized to explain the impact of immersive VR and the manner in which advertisements influence individual viewer response.

Studies centered on the transportation theory that explores the psychological response to transportation have been actively conducted. According to existing research on transportation theory, transportation is strongly associated with empathy (Stansfield & Bunce, 2014). For instance, Johnson (2012) argued that individuals who reported high levels of emotions associated with empathy, such as warmth, compassion, and sympathy, also reported a strong tendency to be deeply transported in a narrative. In addition, transportation can promote an individual’s perception of reality in an environment that is not real (e.g., fiction, virtual environment) (Balakrishnan & Sundar, 2011). This is because individuals can perceive the environment in which a specific entity exists more realistically than in their real environment, as they identify deeply with that entity and are engrossed in and transported to it (Burrow & Blanton, 2016). Furthermore, transportation theory suggests that transportation can be a key mechanism of persuasion because transported individuals may have a higher level of emotional engagement, which makes the content of the message more impactful. Combining the findings of these existing studies, it can be seen that transportation theory can be a useful explanatory tool to investigate what cognitive and emotional responses of viewers in VR advertisements embodied empathy affect. In this study, we

investigated how consumers process information in VR based on transportation theory. Specifically, we examined a model involving psychological processes of embodied empathy, sense of presence, and consumer attitudes. In the following section, we established hypotheses by further addressing transportation theory to each hypothesis.

3.4 Empathy and Attitude in Virtual Reality Sport Advertisements

Empathy is perceived as a vital factor in advertisement because it stimulates consumers’ emotions, and therefore maximizes advertising effectiveness as in attitude towards advertisement or attitude towards brand (Bagozzi & Moore, 1994; Chebat et al., 2003). Attitude represents an overall positive or negative feeling about a certain object and plays an important role in predicting an individual’s behavioral intentions (Ajzen, 2001). In the context of VR advertisements, transportation theory can be used to explain the phenomenon in which a person’s strong empathy with a specific entity elicits an attitude toward an advertisement featuring that entity.

According to transportation theory, transported individuals are more likely to adopt attitudes and beliefs implied by advertisements by forming connections with characters in the advertisement (Sestir & Green, 2010). Specifically, viewers perceive characters as a key part of narrative messages, and the characters engender transportation (Hinyard & Kreuter, 2007). Those receiving a transported message may see themselves as the character or develop strong feelings toward the character. This can in turn elicit a positive affective attitude toward the message’s content and lead to the individual adopting the beliefs portrayed by the character (Sestir & Green, 2010).

A large body of research supported the notion that consumers’ sense of empathy in advertisement has a positive relationship with their attitude towards advertisement and its brand. For instance, Escalas and Bettman’s (2003) study on the effect of emotional advertising appeals presented empathy as positively related to attitude towards advertisement. Moreover, Yu and Chang (2013) showed that the empathy experienced via

advertisement has a positive effect on the attitude towards brand. These results imply that the higher the level of embodied empathy for the athlete in VR sport advertisements, the more positive effect the advertisement can have on the consumer's attitudes.

Meanwhile, several lines of evidence suggest an association between advertising attitudes and brand attitudes. Numerous scholars have empirically investigated advertising attitudes regarding emotion and recognition about a specific product or brand in an advertisement; they have found that attitude toward advertisement is a key antecedent (Lee et al., 2016). Uhm et al. (2017), for example, found that the advertising attitude of consumers who watched three-dimensional advertisements positively influences their attitude towards brand. On this basis, we subdivided attitude into two dimensions, advertising attitude and brand attitude, and examined the effect of embodied empathy on both advertising and brand attitudes. Based on the evidence reviewed here, we propose the following hypotheses:

H1-1: Empathy will have a positive effect on attitude towards advertisement.

H1-2: Empathy will have a positive effect on attitude towards brand.

3.5 Empathy and Presence in Virtual Reality Sport Advertisements

As a concept explaining how an individual perceives a virtual environment, presence has been intensively studied in the field of new media. Presence, as commonly conceived and interpreted, is defined as the subjective feeling of existence in a virtual setting. Lombard et al. (2000) defined presence as user's perceptual illusion of non-mediation, while Schuemie et al. (2001) defined it as being transported to the virtual environment. Presence is often used to evaluate the degree of user's sense of transportation within a VR platform (Mateer, 2017). Presence as transportation focuses on the degree to which viewers experience transport to and situation within a virtual environment (Nowak, 2001).

Presence has attracted attention from scholars in the psychology discipline because it is strongly associated

with empathy (Bachen et al., 2016). Adjacent to the concepts of both empathy and presence is the idea that individuals will respond to fictional portrayals by creating imaginative thought, feelings, and reactions (Schutte & Stilinović, 2017). These thoughts are coherent with individual perceptions, feelings, and actions in real situations. In this respect, empathy and presence share a similar projective mechanism in order to become a part of the experience (Mateer, 2017). The rationale for these arguments aligns with transportation theory, which proposes that transportation facilitates the viewer's feelings as if they were entering and living in the world evoked by the narrative, due to a narrative's characters and the plot's imaginativeness (Burrow & Blanton, 2016). That is, viewers who identify with a character in a VR environment tend to more deeply engage in that environment and perceive it as more authentic as compared to viewers that don't.

Although scholars have long debated about the causal relationship between empathy and presence, several studies have provided evidence that empathy is the antecedent of presence. In fact, our literature review shows that scholars in the field repeatedly reaffirmed the effect of empathy on the viewer's transportation to a non-real environment. For instance, Slater and Rouner (2002) maintained that viewers are transported via empathy. Specifically, empathy lies in how an audience tries to understand the experiences of a story's character, in order to interpret and feel the experience in much the same way. Thus, empathy describes the state of detachment from the world of origin, or story transportation (Balakrishnan & Sundar, 2011). Similarly, Green et al. (2004) argued that immersion could be facilitated by manipulations that encourage empathy or openness can enhance the likelihood of story immersion. Moreover, Shin (2018) found that stimulated empathy in VR can heighten user perception of a virtual environment's realism. In accordance with these arguments, it can be inferred that viewers' empathy can influence their sense of presence.

A sense of presence can provide viewers with a novel experience and create a positive feeling (Yim et al., 2012), because the subjective experience of presence through VR may transport into real-world attitudes

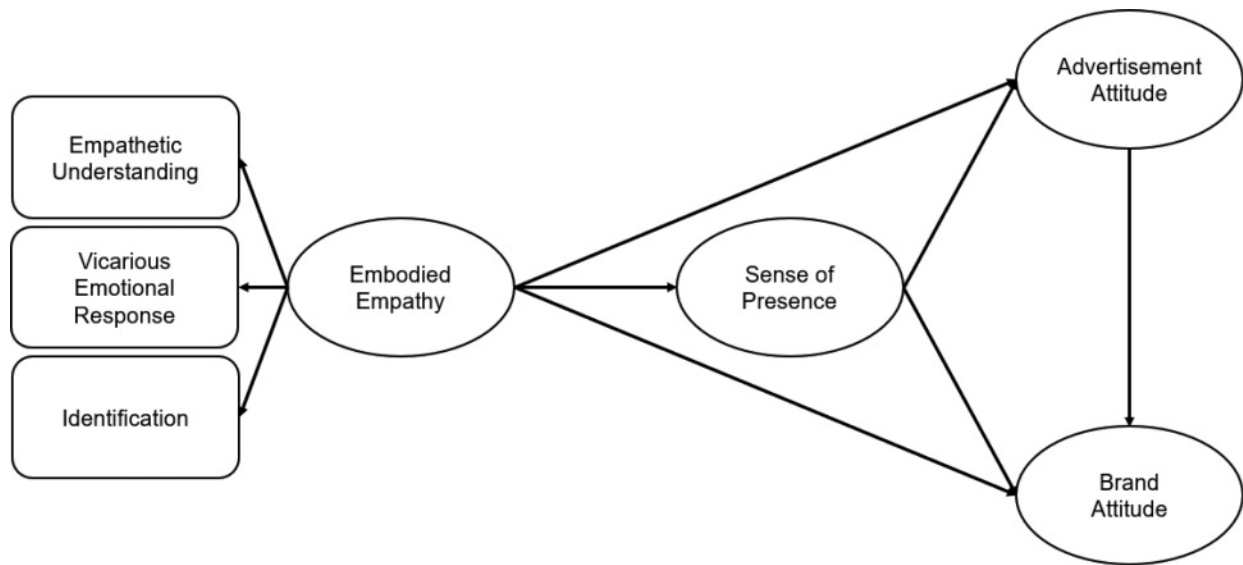


Figure 2. Research model.

(Tussyadiah et al., 2018; Uhm et al., 2020). Indeed, many previous studies have indicated that the perception higher levels of presence can enhance positive attitudes toward the targeted object (e.g., Sundar & Kim, 2005). This indicates that the heightened sense of realism during the VR experience can lead to attitude formation, which can eventually be transported to the physical world. Taken together, we hypothesize the mediating effect of a sense of presence in the relationship between empathy and the attitude towards brand.

In integrating all the hypotheses, sequential information processing is proposed, in which perceived empathy affects attitude toward brand through a sense of presence and attitude toward advertisement. In other words, viewers who perceive empathy for the character in a VR sport advertisement may perceive a higher sense of presence. A higher sense of presence can translate into a more positive attitude toward the advertisement, which may enhance attitude toward the brand. This leads to the following hypothesis:

H2: The influence of empathy on attitude towards brand will be mediated by a sense of presence and the attitude towards advertisement in a causal sequence.

Figure 2 presents the combined effects, postulated in the hypotheses, as a path model.

4 Method

4.1 Participants

We recruited participants living in metropolitan areas from a Far East Asian country. A screening process was employed to exclude participants prone to motion sickness, to prevent injuries caused by VR-induced dizziness. Of the 324 administered questionnaires, 296 completed questionnaires were collected for the data analysis: 240 male (81.1%) and 56 female (18.9%). The average age of the participants was 22.81. We confirmed that no participants had ever seen the VR sport advertisement used as a stimulus in this study.

4.2 Virtual Reality Experience

A VR sport advertisement called “Nike Hyper-venom II—The Neymar Jr. effect” was employed as a research stimulus. In this sport advertisement, viewers indirectly experience the first-person perspective of Neymar Jr., a world-class soccer player, in a story of scoring a goal by overtaking the defenders of the opposing team. After scoring a goal, Neymar’s emotional response to the cheers of the audience is reflected in the narrative of this advertisement. This sport advertisement was purposely

created for the VR experience and provides a split-sphere function, a binocular feature. It also includes a function to view the virtual environment inside the advertisement from a 360-degree perspective, making the environment appear three-dimensional. Samsung New Gear VR was employed as the VR device.

4.3 Measures

The questionnaire comprised scales for empathy, presence, attitude toward advertisement, and brand that the reliability and validity had been adequately assessed in previous studies. We adopted a total of 11 items from Soh (2015) to measure embodied empathy in digital media, which consisted of three subscales: four items measuring empathetic understanding, four items measuring identification, and three items measuring vicarious emotional response. Eight items from Uhm et al. (2017) were used to measure a sense of presence. Items measuring attitude toward advertisement and brand were adopted from three items from Yoon et al. (1995), employing a semantic differential scale. The selected items were modified for the VR context based on experts' suggestions according to content relevance and item clarity. Except for attitude measures, all other items were assessed using a 7-point Likert-type scale (1 = *strongly disagree*; 7 = *strongly agree*). The wording of the items is outlined in the Appendix.

4.4 Procedure

From 2018 to 2019, individuals expressing interest in participating in research at a university in the Far Eastern Asian region were provided with detailed information regarding the study's objectives, participation criteria, and compensation arrangements. Additionally, we assessed whether they had prior experience with advertisements in a VR setting, without disclosing specific details about the stimulus. Participants who had not previously viewed VR sport advertisements and voluntarily agreed to participate completed a consent form. Subsequently, participants were fitted with VR headsets and instructed to watch VR sports advertisements while freely rotating their heads to view the content as

desired. Following the conclusion of the advertisement viewing, participants were assessed for any symptoms of dizziness or motion sickness. If participants did not experience any adverse effects, they were surveyed using paper-and-pencil methods. Lastly, they were provided with compensation totaling 5,000 won (approximately 4 US dollars).

4.5 Data Analysis

The data collected in the current study were statistically analyzed using the following procedures. Descriptive analysis estimated the mean and standard deviation of the variables and checked the normality of the data. A confirmatory factor analysis assessed the measurement model. Then, we calculated absolute fit indices of standardized root mean square residual (SRMR) and root mean square error of approximation (RMSEA), and incremental fit indices of Comparative Fit Index (CFI) to affirm the model fit (Hu & Bentler, 1999). To assess convergent and discriminant validity, composite reliability coefficients and average variance extracted (AVE) values were computed, and compared with square root of AVE (Fornell & Larcker, 1981). Structural equation modeling was employed to examine the hypotheses. Direct paths and indirect paths among the constructs were tested. Bootstrapping with 5,000 iterations were carried out to examine mediation effects and bias-corrected percentile intervals are reported. All analyses were administered employing SPSS 27.0 (IBM Corp., 2020) and Mplus 7.3 (Muthén & Muthén, 2014), at alpha level of .05.

5 Results

Descriptive statistics of the study variables including mean, standard deviation, skewness, and kurtosis are listed in Table 1. Also, internal reliability was assessed using the Cronbach's α values of each construct. The values were above .84, which exceeded the accepted level, .7 (Hair et al., 2019).

The results indicated that the fit of the data to the measurement model was acceptable ($\chi^2 = 877.84$,

Table 1. Descriptive Statistics

Scale	<i>M</i>	<i>SD</i>	Skewness	Kurtosis	Cronbach's α
Empathy	5.12	.79	-1.90	.78	.84
Sense of Presence	4.17	1.26	-.02	-.69	.86
Advertisement Attitude	5.22	1.05	-.79	.63	.90
Brand Attitude	5.69	1.10	-1.10	1.42	.93

$df = 266$, $CFI = .923$, $SRMR = .075$, $RMSEA = .088$). Although the values of $SRMR$ and $RMSEA$ did not indicate a good fit, by applying the criteria from Hu and Bentler (1999), and Browne and Cudeck (1992), they can be considered acceptable. The values of factor loadings (all over .55), composite reliability (all over .81), and AVE values (all over .59) provide evidence in support of convergent validity. Discriminant validity was also supported by evidence that all square roots of AVEs were greater than the absolute value of each corresponding factor correlations. Table 2 presents all the values required to meet convergent and discriminant validity.

The overall model fit of the structural model was acceptable as it was in correspondence with the measurement model ($\chi^2 = 877.84$, $df = 266$, $CFI = .923$, $SRMR = .075$, $RMSEA = .088$). Table 3 provides the results of direct and indirect paths originated from the proposed research model. Reflecting on the hypothesized relationships, a significant path from empathy to brand attitude via a sense of presence and advertisement attitude was evidenced, supporting Hypothesis 2. However, the direct paths from empathy to attitudes toward advertisement and brand were not statistically significant. Thus, Hypotheses 1-1 and 1-2 were rejected.

6 Discussion

Research on VR sport advertisements has been neglected, despite the medium's promise. In this study, we conceptualized embodied empathy appropriate to the VR sport context, empirically investigated its validity, and examined the effects of VR sport advertisements on consumers by integrating interdisciplinary literature in interactive marketing and media psychology. Specif-

ically, we investigated consumers' embodied empathy, sense of presence, and attitude toward advertisements and brands, along with the relationships among these variables.

In this study, we applied the social functionality of emotions in order to conceptualize the empathy experienced from virtual objects in VR as embodied empathy, including empathetic understanding, identification, and vicarious emotional responses. We measured whether embodied empathy was evoked in viewers while watching VR sport advertisements and statistically examined its validity. Convergent and discriminant validity of embodied empathy, specifically, were demonstrated. Such empirical evidence implies that the bodily movements required of VR viewers can evoke empathy for the characters depicted in advertisements, which supports embodiment theory. Moreover, our results suggest that the embodied empathy that can be experienced in a virtual environment exceeds the emotional aspect widely applied in the field of advertisement (Escalas & Stern, 2003). Thus, sport advertisements applied to VR contexts induce a reaction that encompasses cognitive responses beyond the affective dimension of conventional advertisements.

Empirical examination of embodied empathy also contributes to the field by expanding the role of the social functionality of emotions. This has been conceptualized by Niedenthal and Brauer (2012) who argued that various emotions, including empathy, are human neural responses that can arise from social functions based on a dyadic relationship or group relationships between the self and an actual entity. That is, the greater the dyad or group-based interaction, the greater the degree of empathy. Our findings imply that these neural responses are elicited by interactions with virtual entities in VR. We

Table 2. Psychometric Properties of the Measurement Model

Constructs and Items	λ	SE	ρ	AVE	Φ			
					EP	SP	AA	BA
Empathetic Understanding			.95	.84				
Empathetic understanding 1	.91*	.01						
Empathetic understanding 2	.91*	.01						
Empathetic understanding 3	.93*	.01						
Empathetic understanding 4	.91*	.01						
Identification			.97	.89				
Identification 1	.92*	.01						
Identification 2	.95*	.01						
Identification 3	.95*	.01						
Identification 4	.95*	.01						
Vicarious Emotional Response			.86	.68				
Vicarious emotional response 1	.55*	.05						
Vicarious emotional response 2	.93*	.01						
Vicarious emotional response 3	.93*	.01						
Empathy (Second-order) (EP)			.81	.59	—			
Empathetic Understanding	.78*	.04						
Identification	.81*	.04						
Vicarious Emotional Response	.73*	.04						
Sense of Presence (SP)			.86	.68	.27*	[.77]		
Sense of presence 1	.85*	.02						
Sense of presence 2	.86*	.02						
Sense of presence 3	.86*	.02						
Sense of presence 4	.87*	.02						
Sense of presence 5	.88*	.02						
Sense of presence 6	.85*	.02						
Sense of presence 7	.88*	.02						
Sense of presence 8	.89*	.02						
Advertisement Attitude (AA)			.90	.76	.19*	.33*	[.87]	
Advertisement attitude 1	.90*	.02						
Advertisement attitude 2	.83*	.02						
Advertisement attitude 3	.88*	.02						
Brand Attitude (BA)			.93	.82	.17*	.21*	.29*	[.91]
Brand attitude 1	.88*	.02						
Brand attitude 2	.92*	.01						
Brand attitude 3	.93*	.01						

NOTES. λ = factor loadings; ρ = composite reliability; Φ = factor correlations. Square root of AVE in diagonal of correlation matrix. * $p < .01$.

Table 3. *The Result of Direct and Indirect Effects*

Direct Effects	Coefficients and Standard Errors		
	SP	AA	Brand Attitude (BA)
Empathy (EP)	.27 (.06) ^{***}	.11 (.08)	.10 (.08)
Sense of Presence (SP)		.30 (.05) ^{***}	.11 (.06)
Advertisement Attitude (AA)			.23 (.08) ^{**}
Indirect Effects	Standardized	Unstandardized	BC Interval
EP-SP-BA	.03	.05	(-.01, .09)
EP-AA-BA	.02	.04	(-.02, .01)
EP-SP-AA-BA	.02 [*]	.03 [*]	(.01, .06)

NOTES. ^{*} $p < .05$, ^{**} $p < .01$, ^{***} $p < .001$. BC Intervals are the bias corrected 95% confidence interval of standardized estimates resulting from bootstrap analysis.

can therefore infer that the greater the degree of identification with a virtual entity from the first-person perspective, the greater the degree of emotion induced. We believe our study makes a scholarly contribution in extending the conceptualization of the social functionality of emotions via virtual objects in VR settings.

Our results indicated that the effect of embodied empathy on brand attitude is mediated by a sense of presence and advertising attitude in a causal sequence—a psychological process in which the results indicated a significant causal relationship between embodied empathy and sense of presence. Specifically, embodied empathy positively affected the sense of presence. This can be explained by transportation theory, which suggests that transportation can better occur after viewers identify themselves with the protagonist (Burrow & Blanton, 2016). If the viewers identify more strongly with the players appearing in VR sport advertisements, then they will perceive the VR environment as being more realistic. Our results are supported by the findings of Nicovich et al. (2005), that empathy can be a significant predictor of presence. The hierarchical relationship between empathy and presence has been plagued by contradictory results (e.g., Shin, 2018), and this study suggests academic implications by providing evidence that empathy can be an antecedent factor of presence in

a VR context. This result also suggests that the existence of an object with which viewers can empathize can be a significant strategy for bolstering the effectiveness of the VR platform.

The results showed that a sense of presence has a positive influence on attitudes toward advertisements. A considerable direct effect of presence on attitude underscores that the degree to which participants digest data in a virtual environment affects interest and preference in VR sport advertisements. We speculate that this result originates from the novel experience offered by virtual environments. Uhm et al. (2020) asserted that the novel experience of vicariously immersing oneself in a new environment as an athlete through VR can translate to an enjoyable experience and positive attitude. Similarly, our study substantiates the persuasive role of sense of presence, positing that the subjective experience of presence in VR can translate into a real-world mindset. While several advertisement studies have pinpointed positive correlations between presence and more favorable attitudes toward ad and brand (e.g., Klein, 2003), this study clarifies that presence can indeed influence viewer attitudes. Based on these findings, we propose that providing VR advertisement developers and marketers with more immersive, pleasurable virtual environments can help make advertisement more successful.

Our results indicated that attitude toward advertisement had a positive effect on attitude towards brands. We expected this study to confirm that the attitude elicited by a VR advertisement was transferred to an advertising entity (i.e., a brand), consistent with the findings of many studies which have shown that advertising attitudes are essential to forming brand attitudes. It is, for example, consistent with the study by Uhm et al. (2017), which argued that a favorable attitude toward a sport product's advertisement is transferred to brand attitude, as well as the findings of Bennet et al. (2006), that sport advertisement attitude has a significant effect on brand attitude. The results of this study demonstrate that the relationship between attitudes toward advertisement and brands, as reported in previous studies, confirm that advertising attitudes are a key antecedent variable of brand attitudes in sport advertisements. Furthermore, they provide empirical evidence of advertisements preferred by consumers, and in this way, they contribute to the formation of consumer preferences among advertising brands.

Embodied empathy exerts no direct effect on advertisement attitude or brand attitude, rejecting Hypotheses 1-1 and 1-2. These findings contradicted previous studies that suggested that empathy directly affects attitudes toward conventional advertisements (Chebat et al., 2003; Escalas & Bettman, 2003) or brands (Yu & Chang, 2013) on television or in print. We attribute this discrepancy in results to the novelty of VR advertisements. The consumer's empathy response does not appear to lead immediately to an affective phase (i.e., attitude); rather, VR stimulates a cognitive response (i.e., presence) in the consumer. Peterson et al. (2018) observed that immersive VR can provoke a strong cognitive response, whereby users perceive that they are in a real environment; and Uhm et al. (2017) argued that VR advertisements are uniquely able to transport viewers to virtual environments and foster an appreciation of the immersion in the advertisement itself.

The results of this study showed that a sense of presence does not mediate the relationship between empathy and attitude toward a brand, suggesting that VR stimulates consumers' cognitive responses more strongly than

conventional advertisement such as television or web content. According to Dennis and Kinney (1998), new media can convey multisensory cues that increase media richness, and richer media induces a more intense cognitive process in the viewer. Traditional advertising methods such as television are familiar to viewers in that they stimulate viewers' emotional response without engaging their cognitive processes, but VR stimulates both cognitive and emotional responses—a highly effective means of communication by enabling extended information processing and encouraging viewers to more readily accept information and messages from advertisements.

6.1 Theoretical and Practical Implications

This study's finding indicates several significant theoretical implications in the fields of interactive marketing and media psychology as well as in the emerging domain of VR advertisement. First, the study integrates the concept of embodied empathy within a VR sports context, thereby articulating unique emotional and cognitive responses that can be triggered by virtual objects. This conceptualization extends the existing understanding of empathy by emphasizing the importance of empathetic understanding, identification, and vicarious emotional responses within a VR advertisement context. By delving more deeply into the role of embodied empathy, this research adds greater context to embodiment theory, including suggesting that the bodily movements and interactions of VR viewers can stimulate empathy towards characters featured in advertisements. Such perspectives redefine traditional emotional aspects of advertisement and underscore the potential for VR sport advertisement to elicit cognitive responses beyond conventional emotional dimensions.

Second, the study contributes to a broader discourse regarding the social functionality of emotions by examining how interactions with virtual entities in VR environments can elicit neural responses similar to those experienced in human-to-human interactions. The study draws from Niedenthal and Brauer's (2012) concept in

order to demonstrate that VR can provide a platform for generating empathetic responses based on dyadic relationships or group interactions within a virtual space. Such an extension of the social functionality of emotions to virtual objects in VR settings enhances our understanding of the complex interplay between emotions, virtual environments, and human responses. Furthermore, it highlights the potential for VR to amplify empathetic experiences and likewise suggests that a first-person perspective in identifying with virtual entities can influence the intensity of emotional responses. These insights therefore pave the way for further exploration of the intricate relationship between virtual experiences and social emotions.

Third, based on the findings herein, we propose that transportation theory can be usefully applied to the context of VR sport advertisement. Most studies applying transportation theory in the marketing field have focused on conventional advertising mediums (Brechman & Purvis, 2015), whereas our results have extended the theory to the VR context and provided a better understanding of viewers' cognitive and affective responses. Additionally, this study expands the theory by combining transportation and embodiment theories by integrating the viewer's embodied empathy and cognitive and affective responses regardless of VR's variations from traditional advertising platforms.

In addition to theoretical implications, the current study includes several important practical implications in its findings, particularly critical considerations for marketers seeking to harness the potential of VR sport advertisement. First, the study underscores the key importance of embodied empathy within VR advertisement. Marketers must bear in mind that VR provides distinctive avenues in engaging viewers both physically and emotionally. To enhance VR advertisement's efficacy, it is imperative to craft narratives that encourage viewers to connect with virtual entities. VR sport advertisement must evoke embodied empathy, with a specific focus on fostering empathetic understanding, identification, and the eliciting of vicarious emotional responses regarding virtual characters. This is possible within a VR environment through the creation of content that is relatable and emotionally resonant. For example, this research

demonstrates that the interactions of VR viewers can induce empathetic responses.

This study underscores how an enhanced sense of presence shapes viewers' attitudes toward VR advertisement. To fully capitalize on the inherent potential, marketers must emphasize the development of the kinds of immersive virtual environments that can most authentically place viewers at the core of content. Achieving such a goal requires strategic investments in advanced VR technologies, meticulous content design, and the optimization of overall user experiences. By undertaking such efforts, advertisers can captivate viewers while also cultivating a deeper interest and preference for VR sports advertisements. Essentially, by creating genuinely captivating and hyper-realistic virtual experiences, marketers can most effectively engage audiences and attain greater marketing success within VR environments.

Lastly, the research reaffirms the abiding and close correlation between attitudes towards advertising and brand attitudes within VR contexts. Marketers must acknowledge that a favorable perception of VR sport advertisement can produce more significant influence over brand preferences. To harness this influence, it is vital to construct VR advertisement that can authentically resonate with viewers, thereby nurturing positive attitudes. Ensuring alignment between advertising content and a brand's core identity and values becomes paramount, facilitating the transference of positive attitudes from an advertisement to the brand itself. Ultimately, marketers should perceive VR as a strategic instrument not only by which to deliver immersive advertisement but also for establishing brand equity and augmenting consumer engagement.

6.2 Limitations and Suggestions

The generalization of this study may be limited, as the composition of the study participants in this biased toward male participants. This bias could pose challenges, as cognitive and emotional response processing may vary depending on gender (Coley & Burgess, 2003). More specifically, this imbalance could potentially lead to a heightened level of empathy in the results. Future studies should consider the effects of VR

advertisements according to gender by maintaining an even subject gender ratio. We propose an alternative follow-up study in which subjects are divided into gender-based groups to enable analysis of the differences in how VR sport advertisements affect each gender. In addition to investigating gender differences, future research endeavors could also explore other demographic factors, such as age, cultural background, and level of sport involvement, to provide a more comprehensive understanding of the diverse responses to VR sport advertisements.

VR sport advertisements for specific sport brands featuring specific endorsers were used as stimuli in this study. Although we did not provide participants with any information about endorsers or brands in advance, to prevent participants from viewing the stimuli prior to the study, participants may have had preconceived notions about the brands and endorsers prior to the study. The identity of brands and their endorsers featured in the VR sport advertisements used as stimuli in future studies should be kept carefully from the participants prior to the commencement of the study to yield more valid results. Conducting robust experiments with controlled pre-attitudes and the creation of new experimental VR advertisements might be beneficial. Alternatively, exploring various VR sport advertisement contents could yield more valid results.

Our research, implemented in a laboratory setting, could be further limited by its lack of ecological validity, although we made a significant effort to create a natural setting in the laboratory. According to Derbaix (1995), a lack of ecological validity may result in little power to predict consumer behavior. Although we presented all subjects with stimuli in the same laboratory environment, the laboratory environment might differ from the natural environment. Thus, follow-up studies should consider practicing research in a more natural environment, to ensure ecological validity.

Finally, although our study brings significant insight by providing findings about the process of viewers' psychological responses within a VR sport advertisement context—a context that had not previously been closely investigated—it does not supply evidence that these responses could lead to actual consumer behavior. A

follow-up study would make a greater practical contribution by measuring behavioral responses such as purchase intention or actual purchase.

REFERENCES

- Ajzen, I. (2001). Nature and operation of attitudes. *Annual Review of Psychology*, 52(1), 27–58. 10.1146/annurev.psych.52.1.27
- Bachen, C. M., Hernández-Ramos, P., Raphael, C., & Waldron, A. (2016). How do presence, flow, and character identification affect players' empathy and interest in learning from a serious computer game? *Computers in Human Behavior*, 64, 77–87. 10.1016/j.chb.2016.06.043
- Bagozzi, R. P., & Moore, D. J. (1994). Public service advertisements: Emotions and empathy guide prosocial behavior. *Journal of Marketing*, 58(1), 56–70. 10.1177/002224299405800105
- Balakrishnan, B., & Sundar, S. S. (2011). Where am I? How can I get there? Impact of navigability and narrative transportation on spatial presence. *Human-Computer Interaction*, 26(3), 161–204.
- Bennett, G., Ferreira, M., Tsuji, Y., Siders, R., & Cianfrone, B. (2006). Analysing the effects of advertising type and antecedents on attitude towards advertising in sport. *International Journal of Sports Marketing & Sponsorship*, 8(1), 62–82.
- Bertrand, P., Guegan J., Robieux, L., McCall, C. A., & Zenasni, F. (2018). Learning empathy through virtual reality: Multiple strategies for training empathy-related abilities using body ownership illusions in embodied virtual reality. *Frontiers in Robotics and AI*, 5(26). 10.3389/frobt.2018.00026
- Brechman, J. M., & Purvis, S. C. (2015). Narrative, transportation and advertising. *International Journal of Advertising*, 34(2), 366–381. 10.1080/02650487.2014.994803
- Browne, M. W., & Cudeck, R. (1992). Alternative ways of assessing model fit. *Sociological Methods & Research*, 21(2), 230–258.
- Burrows, C. N., & Blanton, H. (2016). Real-world persuasion from virtual-world campaigns: How transportation into virtual worlds moderates in-game influence. *Communication Research*, 43(4), 542–570. 10.1177/0093650215619215
- Cao, S., Nandakumar, K., Babu, R., & Thompson, B. (2020). Game play in virtual reality driving simulation involving head-mounted display and comparison to desktop display.

- Virtual Reality*, 24(3), 503–513. 10.1007/s10055-019-00412-x
- Chebat, J. C., Vercollier, S. D., & G elinas-Chebat, C. (2003). Drama advertisements: Moderating effects of self-relevance on the relations among empathy, information processing, and attitudes. *Psychological Reports*, 92(3), 997–1014. 10.2466/pr0.2003.92.3.997
- Coley, A., & Burgess, B. (2003). Gender differences in cognitive and affective impulse buying. *Journal of Fashion Marketing and Management*, 7(3), 282–295. 10.1108/13612020310484834
- DeGauquier, L., Brengman, M., Willems, K., & VanKerrebroeck, H. (2019). Leveraging advertising to a higher dimension: Experimental research on the impact of virtual reality on brand personality impressions. *Virtual Reality*, 23(3), 235–253. 10.1007/s10055-018-0344-5
- Dennis, A. R., & Kinney, S. T. (1998). Testing media richness theory in the new media: The effects of cues, feedback, and task equivocality. *Information Systems Research*, 9(3), 25–274.
- Derbaix, C. M. (1995). The impact of affective reactions on attitudes toward the advertisement and the brand: A step toward ecological validity. *Journal of Marketing Research*, 32(4), 470–479. 10.1177/002224379503200409
- Escalas, J. E., & Bettman, J. R. (2003). You are what they eat: The influence of reference groups on consumers' connections to brands. *Journal of Consumer Psychology*, 13(3), 339–348. 10.1207/S15327663JCP1303_14
- Escalas, J. E., & Stern, B. B. (2003). Sympathy and empathy: Emotional responses to advertising dramas. *Journal of Consumer Research*, 29(4), 566–578. 10.1086/346251
- Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research*, 18(1), 39–50. 10.1177/002224378101800104
- Fussell, S. G., & Truong, D. (2022). Using virtual reality for dynamic learning: An extended technology acceptance model. *Virtual Reality*, 26(1), 249–267. 10.1007/s10055-021-00554-x
- Gallagher, S., & Cole, J. (1995). Body schema and body image in a deafferented subject. *Journal of Mind and Behavior*, 16, 369–390.
- Green, M. C., & Brock, T. C. (2002). In the mind's eye: Imagery and transportation into narrative worlds. In M. C. Green, J. J. Strange, & T. C. Brock (Eds.), *Narrative impact: Social and cognitive foundations* (pp. 315–341). Lawrence Erlbaum Associates.
- Green, M. C., Brock, T. C., & Kaufman, G. F. (2004). Understanding media enjoyment: The role of transportation into narrative worlds. *Communication Theory*, 14(4), 311–327. 10.1111/j.1468-2885.2004.tb00317.x
- Hair, J. F., Risher, J. J., Sarstedt, M., & Ringle, C. M. (2019). When to use and how to report the results of PLS-SEM. *European Business Review*, 31(1), 2–24. 10.1108/EBR-11-2018-0203
- Hinyard, L. J., & Kreuter, M. W. (2007). Using narrative communication as a tool for health behavior change: A conceptual, theoretical, and empirical overview. *Health Education & Behavior*, 34(5), 777–792.
- Hu, L. T., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling: A Multidisciplinary Journal*, 6(1), 1–55. 10.1080/10705519909540118
- IBM Corp. (2020). *IBM SPSS Statistics for Windows, Version 27.0*. Armonk, NY: IBM Corp.
- Johnson, D. R. (2012). Transportation into a story increases empathy, prosocial behavior, and perceptual bias toward fearful expressions. *Personality and Individual Differences*, 52(2), 150–155. 10.1016/j.paid.2011.10.005
- Kent, B., Mosley, B. N., & Schweidel, D. A. (2019). Advertisements in DVR time: The shelf life of recorded television commercials in drama, reality, and sports programs. *Journal of Advertising Research*, 59(1), 73–84. 10.2501/JAR-2018-042
- Kilteni, K., Groten, R., & Slater, M. (2012). The sense of embodiment in virtual reality. *Presence: Teleoperators and Virtual Environments*, 21(4), 373–387. 10.1162/PRES_a_00124
- Kim, D., & Ko, Y. J. (2019). The impact of virtual reality (VR) technology on sport spectators' flow experience and satisfaction. *Computers in Human Behavior*, 93, 346–356. 10.1016/j.chb.2018.12.040
- Klein, L. R. (2003). Creating virtual product experiences: The role of telepresence. *Journal of Interactive Marketing*, 17(1), 41–55. 10.1002/dir.10046
- Lau, K. W., & Lee, P. Y. (2019). Shopping in virtual reality: A study on consumers' shopping experience in a stereoscopic virtual reality. *Virtual Reality*, 23(3), 255–268. 10.1007/s10055-018-0362-3
- Lee, H.-W., Brison, N. T., Cho, H., Pyun, D. Y., & Ratten, V. (2021). Adopting new technologies in sports marketing. *Frontiers in Sports and Active Living*, 306.

- Lee, H.-W., Cho, H., Lasko, E., Kim, J. W., & Kwon, W. (2020). From knowing the game to enjoying the game: EEG/ERP assessment of emotional processing. *International Journal of Sports Marketing & Sponsorship*, 21(2), 305–323.
- Lee, Y. G., Byon, K. K., Ammon, R., & Park, S. B. R. (2016). Golf product advertising value, attitude toward advertising and brand, and purchase intention. *Social Behavior and Personality: An International Journal*, 44(5), 785–800. 10.2224/sbp.2016.44.5.785
- Liang, C. J., Start, C., Boley, H., Kamat, V. R., Menassa, C. C., & Aebersold, M. (2021). Enhancing stroke assessment simulation experience in clinical training using augmented reality. *Virtual Reality*, 25(3), 575–584. 10.1007/s10055-020-00475-1
- Lombard, M., Reich, R. D., Grabe, M. E., Bracken, C. C., & Ditton, T. B. (2000). Presence and television. The role of screen size. *Human Communication Research*, 26(1), 75–98.
- Mateer, J. (2017). Directing for cinematic virtual reality: How the traditional film director's craft applies to immersive environments and notions of presence. *Journal of Media Practice*, 18(1), 14–25. 10.1080/14682753.2017.1305838
- Muthén, L., & Muthén, B. (2014). Mplus 7.3. *Muthén, Muthén*, 3463.
- Nicovich, S. G., Boller, G. W., & Cornwell, T. B. (2005). Experienced presence within computer mediated communications: Initial explorations on the effects of gender with respect to empathy and immersion. *Journal of Computer-Mediated Communication*, 10(2), 1–17.
- Niedenthal, P. M., & Brauer, M. (2012). Social functionality of human emotion. *Annual Review of Psychology*, 63, 259–285. 10.1146/annurev.psych.121208.131605
- Nowak, K. (2001, May). Defining and differentiating copresence, social presence and presence as transportation. In *Presence 2001 Conference, Philadelphia, PA* (pp. 1–23).
- Peterson, S. M., Furuichi, E., & Ferris, D. P. (2018). Effects of virtual reality high heights exposure during beam-walking on physiological stress and cognitive loading. *PLOS One*, 13(7), 1–17.
- Riva, G., Wiederhold, B. K., & Mantovani, F. (2019). Neuroscience of virtual reality: From virtual exposure to embodied medicine. *Cyberpsychology, Behavior, and Social Networking*, 22(1), 82–96. 10.1089/cyber.2017.29099.gri
- Schuemie, M. J., Van Der Straaten, P., Krijn, M., & Van Der Mast, C. A. (2001). Research on presence in virtual reality: A survey. *CyberPsychology & Behavior*, 4(2), 183–201.
- Schutte, N. S., & Stilianović, E. J. (2017). Facilitating empathy through virtual reality. *Motivation and Emotion*, 41(6), 708–712. 10.1007/s11031-017-9641-7
- Sestir, M., & Green, M. C. (2010). You are who you watch: Identification and transportation effects on temporary self-concept. *Social Influence*, 5(4), 272–288. 10.1080/15534510.2010.490672
- Shin, D. (2018). Empathy and embodied experience in virtual environment: To what extent can virtual reality stimulate empathy and embodied experience? *Computers in Human Behavior*, 78, 64–73. 10.1016/j.chb.2017.09.012
- Slater, M. D., & Rouner, D. (2002). Entertainment—education and elaboration likelihood: Understanding the processing of narrative persuasion. *Communication Theory*, 12(2), 173–191.
- Slater, M., Spanlang, B., Sanchez-Vives, M. V., & Blanke, O. (2010). First person experience of body transfer in virtual reality. *PLOS One*, 5(5), e10564. 10.1371/journal.pone.0010564
- Soh, H. (2015). Effects of consumer empathic response to advertising on attitude toward the Ad—In the context of storytelling advertising. *Advertising Research*, 105, 103–131. 10.16914/ar.2015.105.103
- Spielmann, N., & Orth, U. R. (2021). Can advertisers overcome consumer qualms with virtual reality? Increasing operational transparency through self-guided 360-degree tours. *Journal of Advertising Research*, 61(2), 147–163. 10.2501/JAR-2020-015
- Stansfield, J., & Bunce, L. (2014). The relationship between empathy and reading fiction: Separate roles for cognitive and affective components. *Journal of European Psychology Students*, 5(3), 9–18. 10.5334/jeps.ca
- Statista. (2023). Estimated global spending on VR advertising in the sports industry in 2023. Retrieved from <https://www.statista.com>
- Stevens, L., Maclaran, P., & Brown, S. (2019). An embodied approach to consumer experiences: The Hollister brand-scape. *European Journal of Marketing*, 53(4), 806–828. 10.1108/EJM-09-2017-0558
- Sundar, S. S., & Kim, J. (2005). Interactivity and persuasion: Influencing attitudes with information and involvement. *Journal of Interactive Advertising*, 5(2), 5–18. 10.1080/15252019.2005.10722097
- Tussyadiah, I. P., Wang, D., Jung, T. H., & Tom Dieck, M. C. (2018). Virtual reality, presence, and attitude change: Empirical evidence from tourism. *Tourism Management*, 66, 140–154.

- Uhm, J.-P., Lee, H.-W., & Han, J.-W. (2020). Creating sense of presence in a virtual reality experience: Impact on neurophysiological arousal and attitude towards a winter sport. *Sport Management Review, 23*(4), 58–600. 10.1016/j.smr.2019.10.003
- Uhm, J.-P., Kim, S., & Lee, H.-W. (2023). Stimulating suspense in gamified virtual reality sports: Effect on flow, fun, and behavioral intention. *International Journal of Human-Computer Interaction, 39*(19), 3846–3858.
- Uhm, J.-P., Yoon, J.-I., & Han, J.-W. (2017). The impact of sports ad's presence, flow on advertising effectiveness: Comparison between 2D and 3D. *Korean Journal of Sport Studies, 56*(4), 301–318. 10.23949/kjpe.2017.07.56.4.21
- VanKerrebroeck, H., Brengman, M., & Willems, K. (2017). When brands come to life: Experimental research on the vividness effect of virtual reality in transformational marketing communications. *Virtual Reality, 21*(4), 177–191. 10.1007/s10055-017-0306-3
- Wiederhold, B. K. (2020). Embodiment empowers empathy in virtual reality. *Cyberpsychology, Behavior, and Social Networking, 23*, 725–726. 10.1089/cyber.2020.29199.editorial
- Yim, M. Y., Cicchirillo, V., & Drumwright, M. (2012). The impact of stereoscopic 3-D advertising: The role of presence in enhancing advertising effectiveness. *Journal of Advertising, 41*(2), 113–128. 10.2753/JOA0091-3367410208
- Yoon, K., Laczniak, R. N., Muehling, D. D., & Reece, B. B. (1995). A revised model of advertising processing: Extending the dual mediation hypothesis. *Journal of Current Issues & Research in Advertising, 17*(2), 53–67.
- Yu, H., & Chang, Y. T. (2013). How to influence the brand attitude of the audience by micro-films. *Journal of Promotion Management, 19*(5), 674–686. 10.1080/10496491.2013.839242

Appendix

Wording of Scale Items

Construct	Items
Empathy	Empathetic Understanding
	I comprehended the situations depicted in the advertisement.
	I understood the desires held by the character.
	I understood the motives behind why the character acted in a certain way.
	I understood the emotions experienced by the character.
	Identification
	I perceived similarities between the situations depicted in the advertisement and experiences I have had (or could have).
	I felt that the emotions experienced by the character are similar to those I have experienced (or could experience).
	I perceived similarities between the desires held by the character and desires I have experienced (or could experience).
	I felt that similar situations could happen to me.
	Vicarious Emotional Response
	I felt as if the events were happening to me in real life.
	I felt as if I were the character.
	I experienced a sensation of being present within the depicted situation.
Sense of Presence	
	When the advertisement ended, I felt like I came back to the “real world” after a journey.
	VR advertisement created a new world for me, and the world suddenly disappeared when the advertisement ended.

Appendix (Continued.)*Wording of Scale Items*

Construct	Items
Sense of Presence	<p>During the advertisement, I felt I was in the world the VR created.</p> <p>During the advertisement, I never forgot that I was in the middle of an experiment.</p> <p>During the advertisement, my body was in the room, but my mind was inside the world created by VR.</p> <p>During the advertisement, the VR-generated world was more real or present for me compared to the “real world.”</p> <p>The VR-generated world seemed to me only “something I saw” rather than “somewhere I visited.”</p> <p>During the advertisement, my mind was in the room, not in the world created by VR.</p>
Advertisement Attitude	<p>(1 = Negative; 7 = Positive)</p> <p>(1 = Bad; 7 = Good)</p> <p>(1 = Negative; 7 = Favorable)</p>
Brand Attitude	<p>(1 = Negative; 7 = Positive)</p> <p>(1 = Bad; 7 = Good)</p> <p>(1 = Negative; 7 = Favorable)</p>