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Positive Effects from Negative Virtual Experiences: How Virtual Reality Can Be Used Effectively in Marketing

Kirk Kristofferson, Michelle E. Daniels, and Andrea C. Morales

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Report Summary

Affordable virtual reality (VR) technology has reached the mainstream consumer market. Based on the assumption that it is more persuasive than traditional channels, marketers, brands, content designers, and hardware producers have all rushed to create VR content and push it to consumers. Yet there is little research that examines whether this medium is an effective tactic for marketers, or how consumers might respond to content delivered through VR.

In this report, Kirk Kristofferson, Michelle Daniels, and Andrea Morales examine the persuasive marketing consequences of one-way virtual reality and the psychological process consumers experience while using this medium.

Employing four experiments using both pre-existing and novel virtual content, they find that persuasive virtual reality appeals (vs. the same content experienced in 360-degree 2D) can lead to higher brand support and increased desire for the real-life experience. They also propose a potential underlying psychological process driving these benefits: a reflexive response to virtual content. They find that emotional content experienced in VR (vs. 2D) elicits higher reflexive, or automatic, responses to the stimuli, regardless of the valence of the emotion. These responses, in turn, drive immersion into the experience, and increase the persuasiveness of the appeal. Importantly, they find that if reflexive responses are inhibited, the immersion and subsequent persuasion do not result.

Taken together, the results demonstrate that virtual reality can be a useful tactic for marketers under certain circumstances. The virtual content design is imperative, and distributing content without eliciting automatic reactions may not have the desired persuasive impact.

This suggests that firms should try and design virtual content that elicits a reflexive reaction associated with emotional content, rather than using the technology to provide product or service information. Moreover, marketers may have considerable leeway into the content they choose to promote to consumers, and may not be confined to experiences that focus on positive emotional reactions.

These studies focused primarily on experiential product offerings, and future work could examine how consumers respond to persuasive virtual reality appeals for more tangible or utilitarian products.

Kirk Kristofferson is Assistant Professor of Marketing at the Ivey Business School, Western University, London, Ontario. Michelle Daniels is a doctoral student and Andrea C. Morales is Lonnie L. Ostrom Chair in Business and Professor of Marketing, both at the W. P. Carey School of Business, Arizona State University.

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“The truth is virtual reality just creates a deep hunger for real-world experiences.”
~ Ian Cleary, VP Innovation and Ideation, Relevant Marketing Agency (New York Times 2014)

The above quote parleys one truth and one assumption. The truth is that virtual reality (VR), an artificial environment experienced through sensory stimuli (as sights and sounds, Merriam-Webster 2018), has arrived in the consumer marketplace. Producers such as Samsung and Google are pushing VR hardware to consumers for extremely low cost (Burlacu 2016), and content designers can now create and distribute VR content to consumers by streaming directly to their smartphones (Pearce 2015). Brands and marketers such as North Face and Tourism Australia have also leaped in head first to engage consumers and drive sales. Analysts predict that over \$7 billion will be spent on the technology in 2017 (Greenlight Insights 2017). However, the assumption in both marketer actions and the above quote is that the increased *presence* that the virtual reality experience creates for the consumer leads to an increased desire for the real thing. While this may turn out to be true, research has not yet examined how the virtual reality “*presence*” experience occurs in response to marketing content, or how marketers might be able to use VR most effectively. This research seeks to take the first step in understanding this emerging technology by investigating the psychological processes that lead consumers to experience increased presence in VR environments, and the downstream marketing consequences that this presence can have.

Virtual reality technology is currently being explored to generate positive outcomes in a variety of domains. Currently, it is used by NFL quarterbacks for game preparation (King 2015), tourism marketers to entice potential visitors (Tourism Australia 2016), and therapists hoping to treat patient phobias (Wiederhold and Wiederhold 2000). Across multiple domains, the value the technology provides is the ability to immerse the user into the virtual world. However, not all users react similarly within the virtual environment. Psychotherapy research has found that the ability and time to become ‘present’ in the VR environment varies significantly from person to person (Wiederhold and Wiederhold 2000). Beyond individual differences, no research has investigated the factors that lead to this experience of presence. Is this simply a more engaging medium that offers a more intense emotional experience and transports the viewer (e.g., Wang and Calder 2006, McFerran et al. 2010), or is there something different about the experience compared to other mediums? Further, it is unclear if or how increased presence might have

positive downstream consequences that lead to an increased desire to subsequently engage in ‘the real thing’.

Conceptual Framework

The technological advancement in producing virtual reality experiences has increased exponentially since the medium was first developed. Early VR programs were severely hampered by computing power, processing speed, graphical quality, and programming challenges (Cruz-Neira, Sandin, and DeFanti 1993). With considerable respect to the pioneers of this technology, until recently the virtual sensory experience failed to resemble the real-world. The video game industry can be credited with pushing VR into a new era by focusing on developing hardware and content that could track user movements and update the environment based on user input (e.g., Fox, Arena, and Bailenson 2009). We refer to these virtual environments as collaborative, two-way virtual environments. These environments have been crafted by developers to create an experience within the universe of the game. However, the new wave of virtual experiences – particularly driven by marketers – focuses on the real (rather than crafted) world, constructed using high-definition video recording and extensive post-production video stitching (see appendix 1 for comparisons). Rather than focusing on interactions between user-input and the virtual world, this emerging content is more one-way in nature, and consumers are guided through a strategically-constructed linear experience. In this virtual environment, consumers still have full control over visual gaze and perceive the environment in 360-degrees (i.e., they see the environment in whatever direction they look), but they cannot change the rendered space as in the two-way gaming world. Thus, consumers are able to experience the unique sensory stimuli provided by the virtual environment, but their overall experience is still predominantly under the control of the content producer. We refer to these virtual environments as one-way, persuasive virtual environments.

One-way virtual reality provides marketers the opportunity to offer a unique, engaging and persuasive experience to consumers, while maintaining control over the branding and consumption experience (Park, Bernard and MacInnis 1986). Given the marketing relevance and growing consumer adoption, we focus our investigation on one-way, persuasive virtual environment appeals in order to understand whether they offer potential persuasive benefits to

marketers, and what psychological processes drive the transportation experience in this new persuasion tactic.

While discussion topics of virtual reality in the media and computer science research vary substantially across articles, the constant theme expressed is that experiencing a video in VR makes the consumer feel as though (s)he was physically present in that setting. Across multiple mediums (e.g., narrative stories, print ads, television ads), consumer research has referred to this type of immersive experience as transportation (e.g., Escalas 2004a; van Laer et al. 2014).

Previous computer science research has focused primarily on how transportation can occur in two-way virtual environments and found interaction to be a major factor in the transportation experience (Fox, Arena, and Bailenson 2009). The cost and time required to create such an interactive experience is extensive and reduces the control that marketers have over the message. Given that real-time interaction is not available in one-way persuasive VR, it is not clear whether increased transportation over traditional 2D media might occur in this style of persuasive appeal. Most definitions of VR focus on the increased visual and auditory sensory experiences (Barfield et al. 1995); however, is this truly enough to increase the state of transportation over traditional channels?

The experience of transportation in persuasive virtual reality

Persuasive virtual reality is based on 360-degree video, a filming format that allows consumers to control the direction of the gaze from a first-person (actor) point of view by turning one's head while wearing a headset. These video appeals can also be experienced in two-dimensions on personal laptops as well as in home theaters, thus creating similar control, visual, and auditory experiences as VR. As such, explaining transportation entirely via increased auditory and visual sensory information seems incomplete. Instead, we make the argument that the one-way virtual reality environment elicits higher reflexive responses compared to 2D. Importantly, we propose that it is these reflexive responses to the persuasive content that drive consumer transportation into the appeal. We support this prediction with theory from consumer research, computer science, and psychology fields.

Previous research in the consumer domain has proposed that for narrative transportation to occur, the consumer has to empathize with the characters in the narrative and the plot must

activate his or her imagination. The combination of these two factors is argued to lead to a suspension of reality into the narrative: the psychological state of transportation (van Laer et al. 2014). These transportation requirements cannot be applied directly to virtual reality because VR technology (1) rules out empathy as a requirement by forcing the consumer into the protagonist role through its first-person perspective, and (2) eliminates the need for mental imagery by digitally presenting the narrative. As such, neither requirement is applicable to the current context and transportation into persuasive VR must occur through a different psychological process.

Recent research in consumer behavior has found that individuals who take the point of view of an actor (versus observer) experience the situation more intensely (Hung and Mukhopadhyay 2012). Because virtual reality technology, by definition, shifts the user point of view from observer to actor, thereby amplifying all aspects of the sensory experience, we predict it will heighten automatic physical reactions (e.g., reflexes) to the virtual content, and drive transportation into the experience. Indeed, prior work in computer science on two-way virtual environments has shown that users can exhibit automatic physiological reactions to the VR content (e.g., heart rate, blood pressure, Macedonio et al. 2007; cortisol levels, Bullinger et al. 2005). We propose these automatic reflexive responses are one of the key drivers of transportation in one-way VR because the powerful reaction to the content both increases the cognitive perception that the experience itself is more real (Gerrig 1993; van Laer et al. 2014), and heightens engagement with the affect-inducing stimulus (Nabi and Green 2015), thus transporting the viewer into the virtual world.

The facial feedback hypothesis also supports the assertion that physiological expressions can influence the intensity through which content is experienced even when the expression occurs outside of conscious awareness (Ekman, Levenson and Friesen 1983; Strack, Martin, and Stepper 1988). For example, Strack, Martin, and Stepper (1988) found that an affective reaction to emotional content was intensified when the associated facial expression was facilitated first (happiness/enjoyment: participants held a pen between their teeth which inadvertently makes one smile), versus when it was neutral (neutral: holding a pen in hand). Although subjects were not consciously aware of smiling (because of the pen between their teeth), their physiologically-based facial expressions nevertheless intensified their reactions.

Just as the facial feedback hypothesis demonstrates a link between physiological

reactions and both cognitive and emotional responses, we propose that when consumers' bodies react reflexively to the VR environment, their minds will also feel more transported into the experience. In other words, reacting physiologically makes the VR experience feel more real both cognitively and emotionally. The reflexive response heightens the realism of, and engagement with the experience, and subsequently transports consumers deeper into the VR world. As such, we propose that virtual reality will elicit and amplify physiological reflexive reactions compared to 2D content, thereby resulting in increased transportation into the persuasive appeal. Formally,

H1: Consumers who experience a persuasive appeal in virtual reality will exhibit a stronger reflexive response than consumers experiencing the same appeal in two-dimensional media.

H2: Increased reflexive responses to a media experience will mediate the relationship between media type (VR vs. 2D) and increased transportation.

If our theorizing is correct and it is the increased reflexive response driving the psychological transportation process in VR versus 2D, then factors that weaken the degree to which consumers experience such responses in virtual reality should mitigate the resulting increase in transportation. For example, research examining automatic reactions to fear stimuli demonstrate that reflexive fear responses did not emerge among individuals who did not have the specific fear evoked in the given context (e.g., fear of spiders or heights, Grossberg and Wilson 1968; MacInnis and Price 1987). More simply, consumers who are not afraid of spiders will not exhibit an automatic reflexive response when they see spiders. As such, we propose that:

H3: The likelihood to elicit the reflexive response will moderate the relationship between media type and transportation such that increased transportation in virtual reality (vs. 2D) will not occur when reflexive responses associated with emotional content are muted.

We next turn our attention to establishing predictions regarding the persuasive marketing consequences of increased transportation in virtual reality.

The downstream marketing consequences of transportation in virtual reality

Previous narrative transportation research has found that consumers become immersed into narrative stories (Argo, Zhu, and Dahl 2008; Green and Brock 2000; Wang and Calder 2006,

2009), advertising narratives (Escalas 2004a, 2004b, 2007; Nielsen and Escalas 2010) and two-dimensional television ads (McFerran et al. 2010). According to this research, the consequences of this transported state are increased ad persuasion (belief, attitude, and intention change via brand attitude and likelihood to purchase, Appel and Richter 2007; Escalas 2004a; Green 2004; Green and Brock 2000; Hormes et al. 2013; Marsh and Fazio 2006; Morgan, Movius, and Cody 2009; Strange and Leung 1999; Wang and Calder 2006) and increased positive affect (van Laer et al. 2014). One of the critical components leading to increased persuasion, however, is the affective response that the transportation into the narrative creates (Escalas 2004a, Green and Brock 2000, 702). While previous research has shown affective experience to be a consequence of transportation, we make the argument that the intensified emotional experience in VR can also be an antecedent to transportation and is triggered by a heightened reflexive response evoked by the appeal. In other words, rather than experiencing higher levels of emotion because of increased transportation, we propose that consumers can also experience higher levels of transportation because of the reflexive physiological reaction that one-way VR can elicit (see figure 1 for conceptual model).

If virtual reality does increase transportation over traditional persuasive mediums, then how might this psychological state affect consumers' intention to engage in the same experience in the real world? On the one hand, a commercial VR experience may not increase consumer attitudes or intentions for the real experience due to (a) prior knowledge of the persuasion attempt (Friestad and Wright 1995; Phillips and McQuarrie 2010), or (b) the feeling that one has already seen what the real-life experience has to offer (Mead and Patrick 2016; Papies et al. 2015). For example, Papies et al. (2015) found that participants who were exposed to and mindful of attractive stimuli (e.g., appealing food, sexual partners) were less interested in pursuing the actual experience. On the other hand, previous transportation findings suggest that a transported state can lead to enduring persuasion. For example, Escalas (2007) found that immersion into an ad's narrative reduced the processing of weak arguments and increased overall ad attitude. Moreover, Mandel, Petrova, and Cialdini (2006) found that heightened narrative immersion increased preference for luxury brands because this immersed state allowed participants to better imagine themselves as successful individuals. Finally, research has shown that the transported state increases positive emotional reactions to the content (Escalas 2004a) and subsequently increases purchase intentions (Schlosser 2003). Thus, just as higher levels of

narrative transportation have been shown to increase the effectiveness of persuasion appeals in other modalities, we propose that increased transportation in VR will also increase the persuasiveness of the VR appeal. More specifically, we contend that increased transportation in VR will heighten desire and support for the real-world experience versus the same appeal experienced in traditional 2D media.

H4: Higher transportation in virtual reality (vs. 2D) will lead to higher intentions to engage in or support the featured experience or organization.

Taking this prediction one step further, we propose that virtual reality will increase the positive persuasive consequences even when the reflexive response consumers experience is associated with a negative emotion. Traditionally, marketers have predominantly avoided using negative emotions in persuasive appeals to avoid negative associations between the brand and consumer (e.g., Russell 1998). Indeed, previous research has shown that negative emotions experienced during television shows can in fact lower evaluations of unrelated ads presented immediately after the emotional content (Goldberg and Gorn 1987). However, research also suggests that negative emotions can have subsequent positive effects. For example, Andrade and Cohen (2007) demonstrated that watching a horror movie can lead to increases in both negative and positive affect. Moreover, Dunn and Hoegg (2014) found that experiencing a negative emotion (fear) with a brand increases the brand connection between consumer and brand.

Combining this research with previous transportation findings that demonstrate higher consumer-brand connections lead to increased persuasion (Escalas 2007), we propose that increased transportation in VR will result from heightened reflexive responses even when the associated emotion is negative. While this prediction departs from previous transportation research showing that the affective reactions caused by transportation will increase persuasion when the emotion experienced is positive but not negative (Escalas 2004a), we propose the unique psychological transportation process in VR (via reflexive responses) will increase persuasion even when the responses are associated with negative emotions because the reflexive responses will increase transportation, regardless of valence. Consistent with previous transportation research, we propose this increased transportation will, in turn, lead to increased persuasion compared to traditional mediums. Formally,

H5: Positive persuasive marketing consequences of increased transportation in VR (versus 2D) will result when the emotion associated with the reflexive response is positive or negative.

We test our proposed framework in four studies using multiple reflexive responses and behavioral dependent measures. In all of our studies, we contrast a virtual reality medium with a 360-degree two-dimensional medium. Thus, both formats are novel, cutting-edge marketing mediums currently being explored, yet never tested, by marketers and brands alike. Studies 1 and 2 focus on establishing reflexive responses as an antecedent to transportation in virtual reality. Studies 3 and 4 test the full conceptual framework and examine the marketing consequences of virtual reality.

Study 1

Study 1 provided preliminary support for the hypothesis that a virtual reality (VR) experience elicits stronger reflexive responses than traditional two-dimensional (2D) channels. To conduct this and subsequent studies, we partnered with a virtual reality company to create VR and 360-degree 2D content that elicited the specific reflexive response of interest in each study. The firm also provided us with previously-created commercial content if the content contained a scenario that we felt could elicit a specific reflexive response. The use of both commercial and novel content allowed us to test and demonstrate our effects using real-world marketing campaigns, but also maximize the internal validity and causal process claims we sought to support.

In study 1, we used a real promotional video as the stimuli and a fear response as the reflexive response of interest. The *Iceland Experience* was a promotional virtual tour of Iceland, created by attaching cameras to a helicopter that flew over the various landscapes of Iceland. The video was then edited and put to music to create a cohesive and involved experience in both VR and 360-degree 2D. The overall experience was 3:30 minutes long. Approximately one minute into the experience, the helicopter dramatically flew over a cliff and revealed a rushing river below. This moment provided us the opportunity to elicit a reflexive fear response and examine our prediction.

Procedure

One hundred four marketing undergraduates from a large North American university (ages 18–41, $M_{age} = 21.4$, 51.4% female) participated in this study in exchange for course credit, and were randomly assigned to one of two between-subjects conditions (Media Type: VR, 2D). Participants were run individually and were video recorded with consent.

Upon arrival to the lab, participants were informed that they would be watching a video in either VR or 2D based on their assigned condition.¹ In both conditions, participants were brought into a separate lab room where they were given more information about the video task from a lab assistant. Participants in both conditions viewed the “Iceland Experience.” The video presented an aerial view of multiple Icelandic landscapes; thus, the participant’s perspective was one of seeing the country as if flying through the air.

Media-Type Manipulation. In the 2D condition, participants were instructed to stand on a marked spot approximately five feet from a wall-mounted 60” plasma television. A table with a computer mouse was placed by their dominant hand to allow participants to control the viewing experience (see appendix 2 for experimental set-up). The 2D 360-degree video format allowed the tour to be interactive such that the participants could use their mouse to direct their gaze to explore different views of Iceland by clicking a directional keypad on the television screen. In the VR condition, participants wore a Samsung Gear VR headset to watch the video (see appendix 3 for product details). Participants were able to explore Iceland by turning their head while wearing the VR headset. In both conditions, participants wore headphones to maximize the full experience. Given the novelty of both 360-degree video and virtual reality media, the experimenter provided initial instructions to help participants understand and thereby maximize the overall experience. Specifically, the experimenter guided participants to direct their gaze to “look over” their left and right shoulders, and then to look up to the sky and down to the ground. These instructions were provided in both 2D and VR conditions. Lastly, participants were told that they could look wherever they wanted during the video, but would be given some instructions at various points.

¹ Participants only received media type information based on their assigned condition. More specifically, VR participants were not aware that a 2D version existed (and vice versa). This is the case across all experiments.

Dependent Measure: Reflexive Fear Response. Approximately one minute into the experience, the helicopter flew over a steep cliff and revealed a rushing river below. At this point, the experimenter directed participants to focus their gaze towards the ground and to take a step forward. The experience was akin to taking a step and falling into the rushing river below. We predicted that participants in the VR condition would exhibit a significantly higher reflexive fear response (e.g., hesitation, tentativeness, baby pose/fetal position, Kugler et al. 2013²) than participants in the 2D condition. Two trained coders, blind to the hypotheses, watched each video and coded the reflexive response participants exhibited when taking the “step into the river” on a scale from 1 (very low fear response) to 7 (significant fear response). Any differences were resolved through discussion (This coding procedure is the case in all subsequent studies and will not be discussed further). Upon completion of the Iceland Experience, participants returned to their computer terminals to complete demographic questions and an open-ended suspicion probe, then were thanked and debriefed.

Results

Dependent Variable: Reflexive Fear Response. As predicted in H1, participants’ reflexive responses varied significantly between the two media types. Specifically, participants in the VR condition exhibited significantly higher reflexive responses than participants in the 2D condition ($M_{VR} = 2.78$ vs. $M_{2D} = 1.15$, $t(102) = 5.37$, $p < .0001$).

Discussion

Study 1 provided preliminary support for our hypothesis that a virtual reality medium can elicit higher reflexive responses than two-dimensional media, even when the 2D medium allows for 360-degree viewing (H1). In study 2 we extend our theoretical framework to examine the psychological consequences of these reflexive responses and propose that it is the heightened reflexive responses that are responsible for the increased transportation experienced in VR (H2).

² Previous research has shown that people experiencing a fear of heights take smaller steps, hesitate before moving, and show poor postural control (Brandt et al. 2015; Boffino et al 2009; Coelho and Wallis 2010).

We examine this proposition using a different reflexive (protective) response associated with fear.

Study 2

Study 2 built on study 1 in three ways. First, we extended our paradigm by replicating the results of study 1 while testing and measuring a different type of reflexive fear response: a reflexive, protective one (H1). Second, we provided support for our proposed conceptual process through measured mediation by demonstrating that the increased reflexive responses experienced in virtual reality lead to increased transportation (H2). Finally, in study 2 we created a new 360-degree video that allowed us to explicitly examine protective reflexive responses.

Procedure

One hundred twenty-four marketing undergraduates from a large North American University (ages 18-37, $M_{age} = 21.7$, 52.4% female) participated in this study in exchange for course credit and were randomly assigned to one of two conditions (Media Type: VR, 2D) in a between-participants design. As in study 1, participants were run individually and were video recorded with consent.

The procedure and physical set-up was identical to that of study 1. Upon arrival to the lab, participants were informed that they would be watching an interpersonal experience video, and were brought into a separate lab room with a lab assistant to watch the video in either VR or 360-degree 2D video. Unlike the Iceland Experience from study 1, in this study participants watched a video we created specifically for this study that featured an interaction with another person. The camera in the video was positioned in such a way that, from the participant's point of view, he/she was looking directly at the person in the video as if standing in the room with him. When the video started, a male of average build and appearance was standing in a room facing the participant. The individual slowly walked towards the camera (in the direction of the participant) as if preparing to start a conversation.

Dependent Measure: Protective Reflexive Response. Approximately two seconds later, the individual *nonchalantly* turned away, then very quickly turned back and punched the camera

with full force. The camera was set up on a swivel to snap backwards and then return to its original position to mimic an individual taking a punch to the head and returning to a standing position. The character then immediately threw a second punch. Sound effects were added such that at the moments of contact, the actual sound of a punch to the head was heard. We assessed the protective reflexive response by examining each participant's 'flinch reflex.' The flinch response is an involuntary response to a perceived threat consisting of jerking the head back and raising the arms and hands in a defensive posture (Kimble 1955; Miller 1948; Sheffield 1948). The total experience lasted approximately twenty seconds. When the video ended, participants returned to their computer terminals in the main lab and completed additional measures.

Dependent Measure: Transportation. Immediately after the interpersonal experience, participants completed the following three items to assess how present they felt in the experience using a 1 (not at all) to 7 (very much) scale: “*To what extent did it seem that the person in the video was throwing a punch directly at you?*”; “*How surprised were you when the person in the video threw a punch at you?*”, and “*How threatened did you feel when the person in the video threw a punch at you?*”³

Reflexive Response Self-Report Measure. To examine whether participants recognized that they had responded to this experience in a protective manner, we asked participants the following self-report measure: “*To what extent did you physically react to the punch that was thrown on the video?*” (1 – Not at all, 7 – Very much).

Results

Dependent Variable: Protective Reflexive Response. Two trained coders, blind to the hypotheses, watched each participant video and rated the protective reflexive response using a 1 (Very low) to 7 (Very high) scale. Replicating study 1 and supporting H1, participants receiving the punch in VR exhibited a significantly higher protective response than participants receiving the punch in 2D ($M_{VR} = 2.47$ vs. $M_{2D} = 1.63$, $t(120) = 2.88$, $p < .01$).

Dependent Measure: Transportation. The three transportation items showed acceptable reliability and were averaged to form an index ($\alpha = .74$). Supporting our framework, participants

³ Transportation measures were selected and adapted from the short form transportation scale (Appel et al. 2014).

in the VR condition reported feeling significantly more transported into the experience than participants in the 2D condition ($M_{VR} = 5.44$ vs. $M_{2D} = 4.39$, $t(120) = 3.02$, $p < .01$).

Mediation Test. To test our prediction that the heightened reflexive response in virtual reality drives transportation, we followed Preacher, Rucker and Hayes (2007)'s bootstrapping procedure of 10,000 resamples with replacement. Controlling for media type, higher reflexive responses significantly predicted higher transportation ($b = .41$, $t = 5.08$, $p < .00001$). Supporting H2 and our overall framework, the indirect effect of media type on transportation through reflexive responses was significant ($b = .17$, $SE = .06$, $CI_{95\%}: .06, .31$).

Discussion

The results of study 2 lend further support for our theoretical framework. First, we replicated the results of study 1 such that a virtual reality (vs. 2D) experience led to higher reflexive responses using a different reflex (a protective, flinch response) also associated with fear (H1). In addition, study 2 extended these findings by showing that the more prominent reflexive response is responsible for increased transportation in the virtual reality environment (H2). Finally, results showed that these visceral responses occurred, on some level, outside of participant awareness. Participant self-reports of their behavioral responses did not differ across mediums, yet their actual behavior (as recorded on video) demonstrates that they did.

In study 3 we shift our investigation to better understand the downstream marketing consequences of virtual reality appeals over two-dimensional appeals (H4). We do so by examining a real organization's persuasive appeal and assessing organizational support using a behavioral dependent measure.

Study 3

Study 3 had three goals. The first goal was to extend the conceptual findings of studies 1 and 2 by examining the impact virtual reality can have in a marketing context. Specifically, we examined whether an organization's marketing appeal would be more effective at generating subsequent support when experienced in VR versus traditional 2D media. Our framework

predicts that VR will lead to higher support than 2D media because of the increased transportation felt in the VR environment (H4).

The second goal of study 3 was to replicate the mediation results of study 2 to provide further support for our psychological process claim (H2). The final goal of study 3 was to examine a reflexive response associated with a different emotion. Specifically, in this study we examined a reflexive response (smiling) associated with a positively-valenced emotion: happiness. Given that studies 1 and 2 utilized reflexive responses associated with negatively-valenced emotions, study 3 shows that our effects hold regardless of valence (H5).

Procedure

One-hundred twenty-three marketing undergraduates (ages 18-31, $M_{age} = 20.5$, 47.2% female) from a large North American university participated in this study in exchange for \$5 and were randomly assigned to one of two conditions (Media Type: VR, 2D) in a between-participants design. As in studies 1 and 2, participants were run individually and were video recorded with consent.

The procedure and set-up was identical to previous studies. In this study, however, participants viewed a video created by the Discovery Channel for the Hoedspruit Endangered Species Centre, a non-profit organization located in South Africa, focused on the conservation of rare, vulnerable, or endangered animals (<http://www.hesc.co.za>). The video showed a baby rhino named Matimba drinking her morning bottle (Discovery Channel VR 2015). The video is filmed such that viewers perceive to be standing beside Matimba in her pen with the animal curator. The video is approximately 1:45 minutes long and was pre-tested to elicit a happiness response. Participants watched the entire video in either VR or 360-degree 2D, and then returned to their computer stations to complete additional measures.

Dependent Measure: Reflexive Happiness Response. As in studies 1 and 2, participants were video recorded and reflexive happiness responses were rated on a scale of 1 (Very low) to 7 (Very high). Happiness responses included smiles, touching cheeks, verbally expressing ‘aww’ or giggling (Ekman and Friesen 2003).

Dependent Measure: Transportation. We adapted the transportation measures from study 2 to fit the persuasive appeal. Participants rated how transported they felt in the experience on

the following four items using 1-7 scales: “*To what extent did it seem like the baby rhino was in the same physical space as you?*” (Not at all/Very much), “*The experience made me feel like I was actually in the baby rhino’s pen at the Endangered Species Center*”; “*I could picture myself in the baby rhino’s pen during the experience*”; “*While watching the experience, I had a vivid image of the baby rhino’s pen.*” (Final three items: Strongly Disagree/Strongly Agree, $\alpha = .92$). After completing these measures, participants completed demographic questions.

Dependent Measure: Persuasive Marketing Implications. At the very end of the survey, participants were given the opportunity to provide further support for the Hoedspruit Endangered Species Centre by donating their participation payment (Coded 0 = No, 1 = Yes). Each participant was then thanked, debriefed and paid \$5 for participating if they chose not to donate.

Results

Dependent Variable: Happiness Reflexive Response. Two trained coders, blind to the hypotheses, watched each participant video and rated the reflexive happiness responses using a 1 (Very low) to 7 (Very high) scale. Supporting H1 and replicating the results of studies 1 and 2, participants exhibited a significantly stronger happiness response to the baby rhino in VR than in 2D ($M_{vr} = 3.00$ vs. $M_{2d} = 1.39$, $t(120) = 5.49$, $p < .001$).

Dependent Measure: Transportation. As predicted, participants in the VR condition reported feeling significantly more transported in the experience than participants in the 2D condition ($M_{vr} = 5.69$ vs. $M_{2d} = 4.30$, $t(121) = 5.87$, $p < .001$).

Mediation Test. We followed the same Preacher, Rucker, and Hayes (2007) bootstrapping procedure as in study 2 to test the indirect effect of media type on perceived transportation through the reflexive response. Replicating the results of study 2 and providing further empirical support for H2, the indirect effect was significant ($b = .22$, $SE = .11$, $CI_{95\%}: .03, .47$).

Dependent Measure: Downstream Marketing Support. As predicted, participants in the VR condition were significantly more likely to donate their participation payment to the Endangered Species Centre than participants in the 2D condition ($P_{vr} = 65.2\%$ vs. $P_{2d} = 38.6\%$, Wald $\chi^2(1) = 8.66$, $p < .01$)[†].

[†] Subsequent analysis also showed that the donation rate via the VR appeal was significantly higher than the null hypothesis of 50% (one-sample $t(65) = 2.56$, $p = .013$).

Finally, to test whether our proposed conceptual process was driving the increased organizational support, we performed a serial mediation analysis to test the indirect effect of media type on organizational support through reflexive response and transportation (PROCESS Model 6). Supporting H2, the indirect effect was significant at the 90% level ($b = .05$, $SE = .05$, $CI_{90} : .002, .16$). Importantly, our proposed process chain was the only significant indirect effect. No other combination or order of variables was significant. This result is compelling, as it provides evidence for our proposed relationship order between reflexive responses and transportation.

Discussion

Beyond replicating findings from the previous two studies, study 3 provided evidence for our claim that it is the reflexive responses elicited in VR that drive increased transportation in persuasive virtual environments. This result allows us to identify a novel theoretical process through which the transportation process can occur: reflexive responses as an antecedent of transportation.

Even more importantly, the results of study 3 extend our framework and provide the first investigation of the downstream marketing impact virtual reality can have on consumer choice. Specifically, we found that participants viewing an organization's promotional video appeal in VR were more likely to subsequently support that organization than participants who watched the identical video in 360-degree 2D. To our knowledge, this is the first research to show that persuasive VR can have a significant, positive downstream impact on consumers. To be clear, we also acknowledge that the 360-degree 2D appeal was very persuasive. In fact, nearly 40% of participants chose to donate to the organization following the appeal. Nevertheless, the key takeaway of the current work is that the VR medium was able to significantly increase persuasion over and above this already high level, proving it to be an even more effective means of persuasion.⁵

However, we also note that study 3 is not without its limitations. First, we acknowledge that our serial mediation indirect effect was only significant at the 90% confidence level.

⁵After Study 3 was completed, in order to stay true to the information presented to participants, we made a \$350 donation to support the Hoedspruit Endangered Species Centre.

Although supportive of our overall predictions, it is possible that our effects may also have resulted from our experimental design choice to use two real behavioral measures instead of scale measures. While we feel the use of behavioral measures strengthens our experimental design and findings, this decision may have increased noise and reduced the statistical power of our results.

A second question arising from study 3 is whether the increased downstream consumer support was due to the valence of our chosen reflexive response: happiness. Given that previous transportation research has shown increased persuasion through positive affective responses, our results are consistent with this prior work. If our conceptual framework is correct, and increased consumer support in virtual reality is driven by the increased reflexive response and subsequent transportation the VR medium avails, then our increased persuasion claim should hold even if the emotion associated with the reflexive response is negative in valence. We designed study 4 to address these potential limitations.

According to our conceptual model, factors that weaken the degree to which consumers experience reflexive responses in virtual reality should mitigate the resulting benefits of VR. There are multiple methods to achieve this process-support through moderation (Spencer, Zanna, and Fong 2005) and we sought to identify the most appropriate. Assuming that consumers' reflexive responses are driving the effect, the most straight-forward option to test the proposed process is to remove the response-inducing component of the persuasive appeal; if an appeal doesn't evoke the reflexive response, it also should not increase transportation or persuasion or lead to increased marketing consequences. With this as the goal, we conducted a follow-up study by altering the non-profit's persuasive appeal so that one appeal elicited the reflexive response as previously tested and the other did not. Feedback from study 3 coders suggested that the majority of reflexive responses occurred during the final ten seconds of the appeal when the baby rhino turned towards the camera. As such, we edited the appeal, truncating it by removing the final ten seconds. Marketing undergraduates ($n = 166$) watched one of the two versions of the non-profit's appeal in virtual reality (Reflexive Stimuli: Present vs. Absent) in exchange for course credit. After watching either the full length or edited video, participants indicated how much they wanted to visit the Endangered Species Centre (1 = not at all to 7 = very much) and how likely they would be to make a donation to the Centre (1 = very unlikely to 7 = very likely). We averaged the two items to form a marketing consequences index ($r = .50, p < .001$), and

consistent with our framework, results show participant support for the non-profit was marginally lower when they did not view the reflexive response-inducing appeal ($M_{\text{Reflexive Stimuli Absent}} = 4.55$ vs. $M_{\text{Reflexive Stimuli Present}} = 4.96$, $t(164) = 3.78$, $p = .055$).

Though supportive of our proposed model, an issue with this method is that participants in the two conditions were exposed to two different appeals with varying content. Thus, while the results are consistent with our predictions, there are too many alternative explanations for us to definitively conclude that the lack of exposure to the reflexive response-inducing stimuli drove the lower support.

To address this issue, we felt the most appropriate way to test the moderation hypothesis proposed in our theoretical framework was to examine the likelihood of the reflexive response occurring through an individual difference. This allowed us to hold the content of the appeal constant across conditions. Our theorizing predicts that the heightened reflexive response, and subsequent consequences should not occur when contextual factors mute consumers' ability to experience the response. Recall that research has shown that automatic physiological responses associated with a fear-inducing context (e.g., increased heart rate, skin conductance) do not occur unless individuals have the specific fear associated with the context (Grossberg and Wilson 1968; MacInnis and Price 1987). As such, we designed study 4 to demonstrate that participants unaffected by a particular fear trigger (e.g., those with very low or no fear of heights), who watched the exact same appeal, would not exhibit the reflexive response, and therefore not experience increased transportation in the VR (vs. 2D) environment.

Study 4

The goal of study 4 was three-fold. First, we wished to provide further support for our proposed psychological process through moderation (H3). Second, and building upon the first goal, we changed the persuasive consumption context to be an experiential consumption activity. While support for a non-profit agency is certainly an appropriate indicator of consumer choice, the majority of firms experimenting with the new VR medium tend to offer and promote consumer products and experiences (e.g., Nike, North Face, Tourism Australia). Consistent with this trend, study 4 focuses on a consumption experience. Finally, we sought to demonstrate the

positive persuasive effects of VR on consumption even when eliciting a reflexive response associated with a negative emotion (H5).

We achieved these goals by creating another custom 360-degree video to elicit an intense reflexive fear response in an experiential activity. The video was filmed at the peak of a famous mountain located in the metro area of the participants' home city. The hike to the top is popular, and well-known to be very difficult, especially the final section that is very steep. The view from the top, however, is spectacular as the entire city, valley, and other mountain regions are in full view. Unbeknownst to participants, the video was filmed from the edge of the mountain peak such that the initial forward view consisted of the flat mountain summit, but the view directly behind was a steep drop to the ground far below. During the experience, participants were instructed to look over the edge of the mountain, and take a step off the top of the mountain. To test our moderation hypothesis, as discussed above, we predicted that participants unaffected by this fear experience (e.g., those with very low or no fear of heights) would not exhibit the reflexive response and therefore not experience increased transportation in VR (vs. 2D). For this reason, we measured participants' fear of heights as a moderating variable in study 4.

Procedure

One hundred two marketing undergraduates (ages 19-34, $M_{age} = 21.3$, 52.5% female) from a large North American university participated in this study in exchange for course credit and were randomly assigned to conditions in a 2 (Media Type: VR, 2D) x continuous (reflexive response likelihood) between-participants design. Participants were run individually and video recorded with consent.

The procedure was identical to the previous studies. Upon arrival to the lab, participants were led into a separate room and were accompanied by an experimenter. Participants in both conditions watched the "*Local Mountain* Experience," a 360-degree video created especially for this investigation. Specifically, we hiked a difficult trail to the top of a well-known mountain located in the center of the city and created the 360-degree experience from the mountain's summit, at an elevation of 2,700 feet. As in study 1, the experimenter provided initial

* All references to *Local Mountain* in the study used the true name. We use *Local Mountain* in this paper to minimize identification.

instructions to participants in both conditions to look left, right, up and down, and informed participants that they would receive additional instructions at some point during the experience.

Dependent Measure: Reflexive Fear Response. Approximately 30 seconds into the video, participants were instructed to turn around and direct the gaze 180-degrees behind them. Next, participants were told to look down and take a step forward. Looking down revealed to participants that they were standing on the edge of the cliff with rocks and ground far beneath them. Taking a step forward was akin to stepping off of the mountain and plummeting 1,300 feet down. After taking the step forward, participants continued the experience for the remainder of the video. In total, the *Local Mountain Experience* lasted approximately 1:30 minutes. Participants then returned to their computer terminal to complete additional measures.

Dependent Measure: Transportation. Participants completed the following four items, adapted from the previous study ($\alpha = .89$) to assess how transported into the experience they felt using 1-7 scales: “*To what extent did you feel immersed in the Local Mountain experience?*” (Not at all/Very much), “*The experience made me feel like I was actually on Local Mountain.*”; “*The Local Mountain experience affected me emotionally.*”; “*While watching the experience*”; “*I had a vivid image of Local Mountain.*” (Final three items: Strongly Disagree/Strongly Agree).

Reflexive Response Susceptibility. After completing the transportation measures and cover story questions, participants completed our response likelihood measure. Participants indicated their fear of heights on a scale of 1 (Not at all) to 7 (Very much so).

Dependent Measure: Persuasive Marketing Consequences. Finally, after completing the process and individual difference measures, we assessed participant desire to experience the actual, real-world *Local Mountain* hike. Specifically, participants completed the following three items ($\alpha = .89$) using 1 to 7 scales: “*Based on your experience today, how much do you want to hike Local Mountain?*” (Not at all/A lot), “*How likely are you to hike Local Mountain in the future?*”, “*How likely are you to recommend hiking Local Mountain to a friend?*” (Final two items: Very unlikely/Very likely).

Results

Participants. One participant in the virtual reality condition spun around in a circle rather than looking down and taking a step forward and is excluded from the analysis. As such, the analysis is conducted using one-hundred one usable participants.

Dependent Measure: Reflexive Fear Response. We first tested our prediction that reflexive response susceptibility would moderate the relationship between media type and reflexive fear response. Two trained coders, blind to the hypotheses, watched each participant video and coded the reflexive fear response using the (very little fear) to 7 (significant fear) scale from study 1. Media type was contrast-coded (2D = -1, VR = +1) and fear of heights was mean-centered at 3.59 (SD = 1.89). Media type, mean-centered fear of heights and their interaction were entered in a linear regression to predict the reflexive fear response. Results revealed main effects of both fear of heights ($b = .13, t = 2.09, p = .039$) and media type ($b = .73, t = 6.19, p < .001$) independent variables. However, these main effects were qualified by the predicted interaction ($b = .20, t = 3.12, p = .002$). Results revealed that VR elicits significantly greater reflexive fear responses than 2D among participants with a medium or high fear of heights level; however, among individuals who are not afraid of heights, no differences emerge between the two media types. Floodlight analysis (Spiller et al. 2014) demonstrated that the effect of media type becomes non-significant among participants 1.05 SD below the mean level of fear ($b = .34, SE = .17, t = 1.98, p = .05$). Put another way, the effect of media type on fear response is significant for individuals scoring higher than 1.61 on the fear of heights measure ($M = 3.59, SD = 1.89, 1-7$ scale, see figure 2).

Dependent Measure: Transportation. Next, we tested our full conceptual model by examining the effect on transportation. To test whether our proposed process of media type on transportation through the increased reflexive response is moderated by reflexive response likelihood, we performed a moderated-mediation analysis following Preacher, Rucker, and Hayes's (2007) bootstrapping procedure with 10,000 resamples (PROCESS Model 7). Controlling for media type, higher reflexive fear responses significantly predicted higher transportation ($b = .19, t = 1.97, p = .05$). More specifically, the conditional indirect effect of media type on transportation through fear response is significant except among participants who are not afraid of heights (index of mediated moderation is significant; $b = .04, SE = .02, CI_{95\%}: .003, .08$). Taken together, the result showed support for our proposed conceptual framework by demonstrating process through moderation (Spencer, Zanna, and Fong 2005). Specifically, the

increased transportation generated in the virtual reality medium (vs. 2D) is only experienced when the reflexive response is able to occur (i.e., when people are afraid of heights).

Dependent Measure: Persuasive Marketing Consequences. Finally, we sought to demonstrate support for our claim that the positive persuasive consequences of virtual reality experiences can emerge even through experiences associated with a negative emotion (H5). As predicted, and replicating the effects of study 3, participants in the VR condition were significantly more likely to seek out the real-world experience than participants in the 2D condition ($M_{vr} = 5.72$ vs. $M_{2d} = 5.05$, $t(99) = 2.28$, $p = .025$). Finally, we tested whether the higher likelihood to engage in the real *Local Mountain* experience among virtual reality participants was driven by our conceptual process of reflexive responses and subsequent transportation. To test this proposition, we conducted a serial mediation analysis to test whether the positive persuasive consequences of virtual reality are mediated by reflexive response and transportation. As predicted, the indirect effect was significant at the 95% level of significance ($b = .08$, $SE = .04$, $CI_{95\%}: .01, .19$). Importantly, re-ordering the factors did not produce a significant indirect effect, adding confidence for our framework and psychological process of transportation. Finally, results showed that the positive downstream consequences of VR (vs. 2D) were not realized among participants with low fear of heights (e.g., $-1SD$: $b = .22$, $t = 1.06$, $p = .292$, NS).

Discussion

Study 4 provided support for our conceptual framework by demonstrating the moderating role of reflexive response likelihood. Using a fear response as the focal response, results showed that virtual reality led to significantly higher reflexive fear responses than 2D except when contextual factors muted the reflexive response (e.g., among those not afraid of heights). Testing our full process claim, results showed that the increased transportation experienced in VR (vs. 2D) was not realized among those who did not experience the reflexive response. To our knowledge, this is the first research to demonstrate reflexive responses as an antecedent to the transportation process. Study 4 also replicated the downstream marketing results from study 3 using a consumer-focused experiential product appeal. Specifically, virtual reality led to increased likelihood of seeking out the actual consumption experience, even though the VR experience elicited a reflexive response associated with a negative emotion. These positive

persuasive effects were driven by the higher reflexive response and subsequent transportation in the VR environment. This result is also of considerable theoretical interest as it is the first to show enhanced persuasion through transportation when associated emotions are negative (Escalas 2004a, 36). Finally, study 4 helps to rule out a potential alternative explanation of our effects: novelty. One possible explanation of our results is that the differences emerge simply because VR is novel and unfamiliar. However, the moderation results in study 4 suggest this explanation not to be the case. Specifically, the lack of a reflexive reaction and subsequent increase in transportation in VR among participants not afraid of heights suggests that novelty or unfamiliarity is not driving the observed differences.

General Discussion

Across four studies, using reflexive responses associated with both negatively- and positively-valenced emotions, we provide the first consumer investigation into the effectiveness virtual reality can have in a marketing context. Not only do we show the positive persuasive marketing consequences this medium can have, we also demonstrate the psychological process through which this medium increases persuasion over traditional channels: a state of transportation driven by heightened reflexive responses. Using an actual marketing virtual reality experience, study 1 found that consumers exhibited significantly higher reflexive responses (fear) when experiencing a persuasive appeal in virtual reality than via a 360-degree two-dimensional video. Using a virtual experience created specifically for our purposes, study 2 replicated this effect using a different reflexive fear response (protective) and demonstrated through measured mediation that higher reflexive reactions in VR lead to increased transportation into the experience. Study 3 used a persuasive one-way virtual experience created for a real non-profit organization and replicated the reflexive response and mediation finding from study 2 using reflexive responses associated with a positive emotion: happiness. Importantly, study 3 also demonstrated the positive persuasive marketing implications that virtual reality experiences can have. Specifically, participants were more persuaded when experiencing the appeal in VR over 360-degree 2D (willingness to donate to the organization). Study 4 provided conceptual support for our proposed process through moderation by demonstrating that increased transportation in VR over 2D is not realized when the reflexive

response is muted. Importantly, the results of study 4 showed that the positive marketing consequences are only realized for individuals who exhibit reflexive responses to the VR content.

Contributions

The present research offers multiple contributions to the literature. First, we provide an initial empirical investigation of the downstream consequences virtual reality can have in a persuasive marketing context. For the first time, VR technology is accessible to the mainstream consumer market at an affordable price, and marketers are rushing to produce and distribute content to potential consumers under the assumption it will increase sales. Our research shows that this assumption may be true, but cautions that the benefits the technology provides over traditional channels may be contingent upon the content eliciting reflexive responses. Importantly, we demonstrate that the persuasive benefits of virtual reality can emerge when reflexive responses associated with emotional content are elicited.

Second, we contribute to previous transportation consumer research by examining the persuasiveness of a novel and emerging means of communication: virtual reality. Importantly, not only do we demonstrate its persuasive benefits compared to more traditional channels (e.g., two-dimensional television advertising, McFerran et al. 2010), but we also identify a novel theoretical process through which transportation occurs in this medium. Specifically, we identify reflexive responses as key drivers of the psychological transportation process in virtual reality. To our knowledge, this is the first research to demonstrate reflexive responses associated with emotions as an antecedent to the transportation process rather than a consequence (Escalas 2004a, Green and Brock 2000). Moreover, we also demonstrate that the transportation process can occur, and the persuasive benefits realized, even when negative emotions are associated with the experience. Previous research has suggested that the persuasive benefits of transportation may be limited to associations with positive emotions (e.g., Escalas 2004a); however, by connecting transportation findings to recent research highlighting the potential consumer-brand connection benefits that negative emotions can have (Dunn and Hoegg 2014), we predict and find that the persuasion benefits of transportation can result even when associated with negative emotions.

Third, we make important theoretical contributions to both consumer research and computer science fields. In addition to providing the first empirical evidence into the persuasive impact one-way virtual reality can have, this research contributes conceptually by clarifying the relationship between reflexive responses and transportation in one-way VR. Specifically, the moderation results from study 4 demonstrate that increased transportation in one-way VR over more traditional channels results when a reflexive response associated with emotional content is realized.

Managerial implications and directions for future research

Our work offers considerable insight to practitioners regarding the impact that virtual reality technology can have in marketing. For the first time, virtual reality is becoming commercially available to consumers at an affordable price point. This drastic increase in consumer accessibility has spurred an incredible response from companies and brands to develop virtual contexts to engage with consumers. Our results show that heightened reflexive reactions elicited through VR can lead to higher transportation into the experience and drive subsequent positive downstream consequences. This suggests that firms should try and design virtual content that elicits a reflexive reaction associated with emotional content, rather than focusing on using the technology solely to provide information. However, it is important to note that occasionally these effects might be overpowering. For example, some VR racing games require users to physically pedal a stationary bike to increase speed. According to one user, the feeling of speeding down the raceway “was so intense I got dizzy, my stomach hurt, and my eyes dried up,” (Wong 2016). Given these types of reactions, it is important that marketers strike a balance between making the experience feel real vs. too real by inducing nausea and sickness.

Moreover, given the persuasive benefits of virtual reality occurred regardless of the valence of the associated emotions, marketers may have considerable leeway into the content they choose to promote to consumers, and may not be confined to experiences that focus on positive emotional reactions.

We believe that our work provides ample opportunities for researchers to expand our understanding of this novel medium’s potential. For example, while our studies focused primarily on experiential product offerings, future work could examine how consumers respond

to persuasive virtual reality appeals for more tangible or utilitarian products (e.g., Hirschman and Holbrook 1982; Batra and Ahtola 1991). Would VR appeals for utilitarian products exhibit similar increases in persuasion as demonstrated for experiential ones? If so, is the psychological process by which these downstream consequences are realized the same? Future research investigating this relationship would add considerable value to our current understanding of virtual reality's place in a brand's toolkit.

Admittedly, additional details regarding the specific processes by which the reflexive responses result in higher levels of transportation and persuasion still need to be explored. Our results indicate that stronger physiological responses lead to heightened cognitive and emotional experiences which transports the consumer deeper into the VR world, but there are other processes likely at play as well. Specifically, for the reflexive responses that are associated with negative emotions, like fear, there may be misattributions of arousal that are contributing to the positive marketing consequences observed. Future work is needed to better understand the relationships between reflexive responses, transportation, arousal, and attitudes in VR environments.

In conclusion, the present research takes an important first step towards understanding the potential implications that virtual reality technology can have in the marketing industry. Across four studies using both novel and real virtual reality promotional content, we demonstrate the potential benefits this emerging technology can have, and outline the psychological process through which consumers experience persuasive virtual reality. In doing so, we contribute theoretically to both consumer research and computer science fields and substantively to marketing practitioners. Importantly, this research opens a number of doors for future research with the hope of providing a pathway to a future ripe with real opportunity in a virtual environment.

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FIGURES

FIGURE 1: FULL CONCEPTUAL MODEL

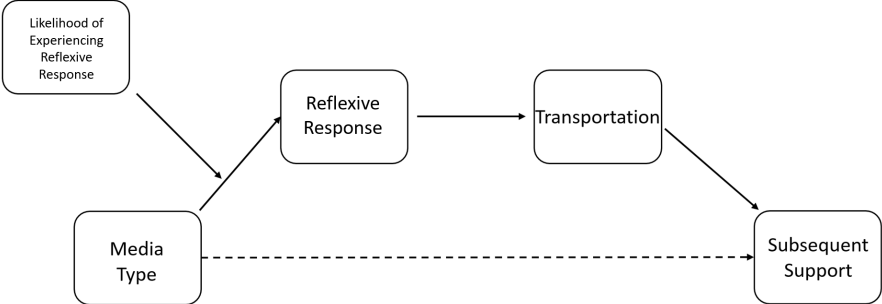
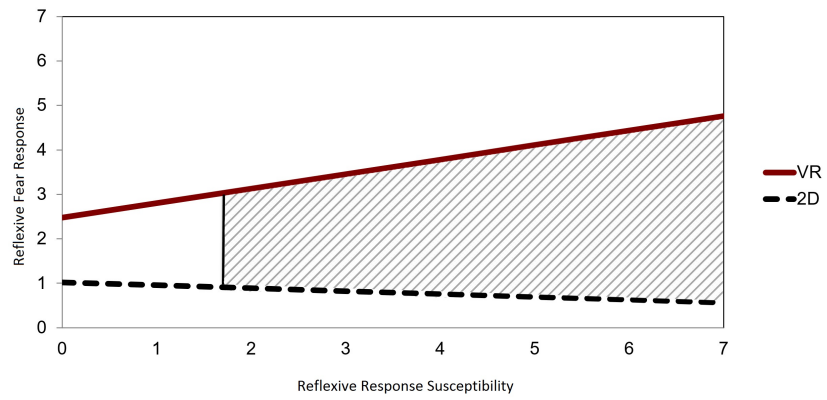


FIGURE 2: STUDY 4 RESULTS: REFLEXIVE RESPONSE MODERATION



APPENDIX 1 – VIRTUAL REALITY: “THEN AND NOW”

EARLY VIRTUAL REALITY EXPERIENCE – TREES:



CURRENT VIRTUAL REALITY EXPERIENCE – TREES:



EARLY VIRTUAL REALITY EXPERIENCE – LANDSCAPES:



CURRENT VIRTUAL REALITY EXPERIENCE – LANDSCAPES:



APPENDIX 2 – EXPERIMENTAL SET-UP

360-DEGREE TWO-DIMENSIONAL CONDITION:



VIRTUAL REALITY CONDITION:



APPENDIX 3 – SAMSUNG GEAR VR PRODUCT SPECIFICATIONS



Product Specifications:

Dimensions: 7.7 inches (width) x 3.3 inches (depth)

Display Type: Super AMOLED

Field of View: 96 degrees

Refresh Rate: 60 Hz

Resolution: 1440 x 1280 per eye

Interpupillary Distance: 54-70mm

Phone input: Samsung Note 4