

How Virtual Face Video Engage Consumers: A Mediating and Moderating Model for the Underlying Mechanisms

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ABSTRACT

This research compared the impact of virtual (VR) and real (R) face videos on engagement and examined the mediating roles of trust, enjoyment, curiosity, and Infohunt (willingness to check information before purchase), alongside the moderating effects of actor gender sensitivity and digital literacy. From September 2023 to April 2024, 403 participants from various provinces in mainland China participated. Using SPSS PROCESS models, we analyzed mediating and moderating effects while controlling for age, gender, education, and product type. Virtual face videos were associated with engagement and curiosity as a mediator, while real face videos influenced trust, enjoyment, and Infohunt. Trust, enjoyment, Infohunt, and curiosity positively influenced engagement. High levels of digital literacy and gender sensitivity significantly moderate the impact of ad types on Infohunt. This study contributes to understanding how different video types and individual characteristics shape consumer engagement and information-seeking behavior in advertising contexts.

Keywords: Virtual face video, real face video, engagement, trust, enjoyment, curiosity, infohunt, digital literacy, ad gender sensitivity.

INTRODUCTION

Virtual reality (VR) technology has revolutionized many industries (Pantano & Servidio, 2012) and its recent integration with artificial intelligence (AI) tools has garnered significant attention in the fields of marketing and advertising. Recent progress of artificial intelligence makes it easier to edit facial movements in videos or create face substitutions (Fei et al., 2021) and this innovative combination has given rise to a new generation of advertisements and transforming traditional marketing strategies. Virtual reality marketing is the use of VR technology to create immersive experiences for consumers to engage with brands and products. VR marketing has the potential to increase consumer engagement, improve brand awareness, and enhance customer experience (Yung & Khoo-lattimore, 2017).

Research on virtual reality marketing is relatively new, but several studies have investigated the impact of VR on consumer behavior (Kim et al., 2020). Virtual reality (VR) has proven to have a profound impact on brand engagement, creating memorable and emotionally connected experiences for consumers. The integration of virtual reality (VR) in the education system has revolutionized traditional learning methods, offering immersive and interactive experiences that enhance student engagement and knowledge retention." (van Berlo et al., 2021) mentioned that, the integration of brands in virtual reality (VR) games can evoke positive and negative emotional responses in players, impacting their attitudes towards the brand and purchase intentions. Additionally studies have examined the effect of VR on various aspects of consumer behavior, including brand awareness, product evaluation, purchase intention, and loyalty (de Regt et al., 2021). VR has been found to enhance brand awareness by providing immersive experiences that help consumers remember brands better (Rumokoy et al., 2015). It has also been found to improve product evaluation by allowing consumers to interact with products in a realistic environment, leading to more positive attitudes towards the product. VR has also been found to increase engagement by providing a sense of ownership and control over the product (Han et al., 2022).

Recently, consumer behavior research has identified two broad categories of products: search and experience products. Search products are those that have clearly defined and measurable attributes, and consumers can evaluate these attributes before purchase. On the other hand, experience products are those that are more subjective and difficult to evaluate before purchase. Consumers often rely on their experiences with the product after purchase to evaluate its value (Arora, 2006). The greater the need to employ one's senses to assess a good is, the more experience characteristics the product possesses. By contrast, the more one thinks that product information will be adequate to evaluate a good, the more search characteristics the product possesses (Luan et al., 2016). Understanding the differences between these two types of products is crucial for marketers in developing effective marketing strategies. On the other hand, in today's 21st century, literacy extends beyond traditional forms and encompasses additional concepts that require attention. Media literacy, digital literacy, and information literacy have emerged as crucial skills in our increasingly interconnected world (Ameera et al., 2021). Media literacy involves the ability to critically analyze and interpret various forms of media, while digital literacy encompasses proficiency in utilizing digital technologies effectively. As VR devices become more accessible, individuals can engage in a wide range of virtual experiences, which may depend on their familiarity with the new technology. The unique sense of presence and interactivity provided by VR has sparked interest in its impact on engagement and making it a significant area of research.

In the realm of research examining engagement and purchase intention, the incorporation of mediating variables such as Trust, Curiosity, Enjoyment, and Infohunt (Huang et al., 2013) which means the willingness of searching information before purchasing has garnered attention. Similarly, (de Regt et al., 2021) found that VR ads increased product interest and engagement, especially among consumers who were high in need for cognition. Trust serves as a fundamental factor influencing individuals' perceptions and decisions, while curiosity sparks interest and exploration, and enjoyment enhances positive experiences, also Infohunt measure the willingness of participants to check information before buying products. Understanding the mediating effects of these variables provides insights into the underlying mechanisms which influences engagement. By investigating Trust (Liao & Chung, 2019), Curiosity (Yang et al., 2020), Enjoyment (Mouatt et al., 2020) and Infohunt as mediators.

LITERATURE AND HYPOTHESES

Several studies have investigated the effectiveness of VR in advertising, highlighting their potential to enhance consumers' attention and engagement. For example, (Han et al., 2022) found that VR ads generated greater engagement and positive attitudes compared to traditional video ads. However, other studies have reported mixed or limited effects of VR and AR on consumer behavior and attitudes, highlighting the importance of individual differences and contextual factors in shaping the effectiveness of these technologies. Similarly, it showed that the impact of AR ads on product evaluations was moderated by consumers' need for touch and haptic feedback. Furthermore, the use of VR and AR in advertising raises ethical and social concerns related to privacy, consent, and manipulation. (Hu, 2022) argued that the immersive and persuasive nature of VR and AR can lead to a loss of agency and autonomy for consumers, and emphasized the need for transparency and accountability in the use of these technologies. (Tayal et al., 2022) highlighted the potential for VR and AR to perpetuate harmful stereotypes and biases, and proposed guidelines for responsible design and implementation of these technologies in advertising. VR technology is applicable in various fields. These responses are influenced by the congruence, enjoyment, and immersion of brand integration in the game, as well as the level of player involvement. Brands can utilize VR games as a unique and immersive platform to engage with consumers, but must carefully consider integration to avoid negative player reactions. on the other hand in the education system immersive virtual reality (IVR) can also be used for training and professional development in fields such as medicine, architecture, and the military (Freina & Ott, 2015). IVR can be used to simulate real-world scenarios and environments, allowing students to practice and apply their knowledge in a safe and controlled environment. It also can be used to foster collaboration and social learning, allowing students to work together in immersive and interactive virtual environments. Then we established our hypothesis:

Hypothesis 1: Virtual face video will be directly associated with engagement.

In current research we aim to examine the effects of real face video and virtual face video on engagement. Trust fosters a sense of security and assurance, allowing customers to openly connect and interact with the brand. It creates a positive perception of the brand's intentions, values, and ethical practices. findings suggest that placing ads on platforms that have earned higher levels of consumer trust can enhance ad effectiveness. When platforms prioritize user privacy, such as offering visibility settings for consumer-generated content based on user preferences, consumers are more inclined to engage with media activities (Geng et al., 2021). As a result, customers are more willing to actively participate in brand activities, such as sharing feedback, advocating for the brand, and participating in brand communities. (Bowden, 2009) proposes a conceptual framework of customer engagement as a process that includes commitment, involvement, and trust which we want to measure as a mediator as well. (Liao & Chung, 2019) develop a model that illustrates how consumers' relationship with a brand community on social media influences brand trust. In our study we propose the following hypothesis in this study:

Hypothesis 2: Real face video will be indirectly associated with Engagement through Trust.

Curiosity represents a desire to know about anything and includes the methods used to resolve the arousal it elicits (Hill et al., 2016). (Yang et al., 2020) investigates how social influence affects individuals' attitudes and behaviors by amplifying or diminishing their curiosity. Curiosity will serve as a mediator parameter in the relationship. The next hypothesis is based on curiosity as following:
Hypothesis 3: Virtual face video will be indirectly associated with Engagement through Curiosity.

Enjoyment has a significant impact on customer engagement. When customers enjoy their interactions with an advertisement, they are more likely to actively participate, spend more time engaging, and exhibit higher levels of enthusiasm (Mouatt et al., 2020). Enjoyment fuels motivation and encourages customers to explore different aspects of the brand, such as its products, services, or content. Furthermore, customers who have enjoyable experiences are more inclined to share their positive experiences with others, both online and offline. Their enthusiasm and willingness to recommend the brand to others can amplify the reach and impact of the brand's engagement efforts.

Hypothesis 4: Real face video will be indirectly associated with Engagement through Enjoyment.

As Virtual Reality (VR) technology continues to advance, there is a growing interest in understanding the relationship between the level of realism in VR environments and users' experiences. While it may seem intuitive that highly realistic environments would enhance the sense of presence and engagement, creating such environments can be time-consuming and expensive (Luan et al., 2016). Studies on VR have produced mixed results, suggesting a more complex relationship between realism and user experience. Furthermore, existing studies often fall short in analyzing user experience and behavior when the VR environment represents a real-world setting with altered levels of realism (Gisbergen et al., 2019). In this case, the willingness to check information before buying products will enhance engagement with advertisements. By introducing the Infohunt variable, which represents the willingness to check information, we can better understand and examine its mediating effect on this relationship.

Hypothesis 5: Real face video will be indirectly associated with Engagement through Infohunt.

In recent years, there has been growing interest in understanding the role of gender in advertising and its potential impact on consumer behavior. Interestingly, research shows that (Goodrich, 2014) men and women exhibit varying responses to these attributes. For instance, studies indicate that women tend to prioritize textual elements in advertisements, whereas men demonstrate a stronger preference for visual content. Conversely, another study revealed that males generally hold more favorable opinions towards advertisements that emphasize images rather than words. In contrast, females tend to favor advertisements that rely more on verbal communication than visual elements (Putrevu, 2013). As (Tan, Yingsi, 2023) revealed that Physical appearance is vital for personal branding, significantly shaping people's perceptions. Attractive individuals are often seen as having superior interpersonal traits and are more likely to form social connections. Then we introduce an additional moderating variable, called Adgensen, to assess its moderating effect on Infohunt (see Figure 1) and propose the following hypothesis:

Hypothesis 6: Adgensen will moderate the effect of VR/R video on Infohunt.

Digital literacy is a crucial skill set required in today's technology-driven world. It encompasses the ability to find, evaluate, utilize, create, and communicate information effectively using digital tools and platforms. Many people have put forward their different understandings of digital literacy in the past few years. According to (Editors et al., 2013) digital literacy is defined in 5 areas: (1) information and data literacy, (2) communication and collaboration, (3) digital content creation, (4) safety, and (5) problem solving. Similarly (Helsper & Eynon, 2013) put forward a set of four digital skills: technical, social, critical, and creative skills. Furthermore, (van Deursen et al., 2016) built a set of items and factors to measure Internet skills: operational, information navigation, social, creative, mobile. More recent literature (van Laar et al., 2017) divides digital skills into seven core categories: technical, information management, communication, collaboration, creativity, critical thinking, and problem solving. We aim to incorporate digital literacy as a parameter of Digiskill to act as a moderator. Our goal is to assess its moderating mediating effects, like Figure 1, and understand its impact on Infohunt.

Hypothesis 7: Digiskill will moderate the effect of VR/R video on Infohunt.

Products can typically fall into one of two categories: search and experience. The primary distinction lies in whether consumers can assess the quality of the product before making a purchase decision. This fundamental difference underscores their intrinsic nature (Wells et al., 2011). Based on this distinction, we have decided to categorize products into two types and measure this as a control variable. Specifically, we classify sport shoes as an experience product and air pods as a search product group.

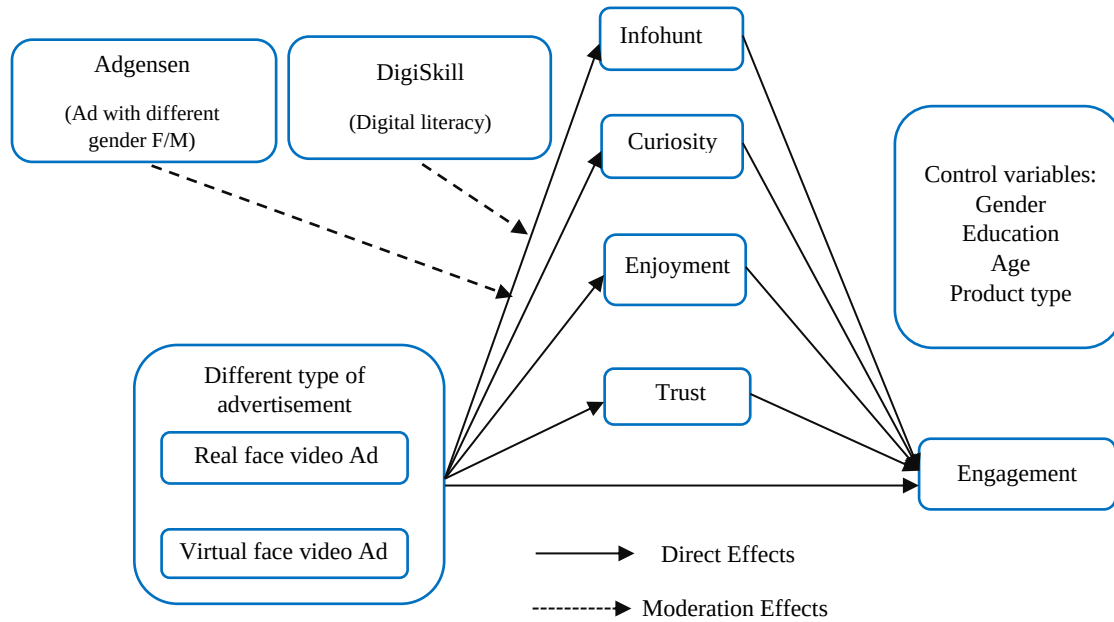


Figure 1:Hypothesized conceptual model.

RESEARCH METHODOLOGY

Participants and Data Collection Procedures

This study collected data from 403 participants, all residing in China. Initially, there were 430 responses, but 27 responses with missing data were manually omitted before data analysis. Among the final 403 participants, 69% were aged between 18 and 25, 25.6% were aged between 26 and 35, and the remaining participants were older. The gender distribution was 51.4% male and 48.6% female. In terms of educational background, 73.2% were undergraduate students, while 26.8% were postgraduate or above. Participants were recruited between September 2023 and April 2024 using the WeChat platform, where the questionnaire was shared and individuals were kindly asked to participate. This approach ensured a diverse and representative sample.

Pilot Test

Prior to the main data collection, a pilot study was conducted with 80 participants. This pilot study aimed to assess the reliability and clarity of the questionnaire items and the visibility of the video content used. The data collected from the pilot study were analyzed to examine the questions according to theoretical boundaries using Cronbach's alpha coefficient. The Cronbach's alpha coefficient, which ranges from 0 to 1, was used to measure the internal consistency of the questionnaire. A coefficient greater than 0.7 indicates acceptable reliability. The feedback obtained from this pilot study was utilized to refine the questionnaire and ensure that the video, presented via the Bilibili application, was completely visible and understandable (the Bilibili app was used solely for video display, while the questionnaire was used for data collection). Both the questionnaire and videos were designed in Chinese and featured Chinese actors to ensure cultural relevance and ease of understanding for the participants.

Experimental Design

Out of the 403 valid responses, 52.1% were for the virtual type of video (VR), and 47.9% were for the real type of video (R). The experiment involved two types of groups: one experiencing Nike shoes as an experiential product and the other experiencing Air Pods as a search product. These groups were exposed to both virtual and real video advertisements and as mentioned before by 2 different genders of advertiser.

Measures

In the data processing, the VR video variable is coded as 0 and the R video as 1. The negative association with engagement reflects the impact of the VR video (coded as 0) on engagement, highlighting an inverse relationship. On the other hand, when stating that the variable (VR/R video) has a positive association with trust, enjoyment, and Infohunt, this indicates that the R video (coded as 1) exerts a stronger influence on these factors compared to the VR video. Additionally, the negative association with curiosity reflects the influence of the VR video, while the positive associations with trust, enjoyment, and Infohunt reflect the influence of the R video. In general, 'negative' associations refer to the impact of the VR video, and 'positive' associations refer to the impact of the R video. To collect empirical evidence, the study utilized a questionnaire consisting of items adopted from existing literature, measured using

a 5-point Likert scale (1 = not at all, 5 = very much). The questionnaire aimed to assess various constructs relevant to the study's objectives. Additionally, I asked participants three questions about their age, education, and their gender to use as control variables for a more precise analysis.

The data collected from the questionnaire were analyzed using SPSS software. Analysis of Variance (ANOVA) was employed to check the main effects of the variables, specifically the difference between virtual face video ads and real face video ads. The results indicated significant findings, which will be discussed in detail in subsequent sections.

RESULT

A one-way ANOVA was conducted to examine the effect of the type of video (virtual vs. real) on engagement. The results indicated that different type of video had a significant effect on engagement ($F(1,401) = 19.264, p < .001$). Specifically, the sum of squares between groups was 16.181, with a mean square of 16.181. The sum of squares within groups was 336.813, with a mean square of 0.840.

Mediation Analysis

PROCESS Model 4 was utilized to investigate the mediating role of Trust, Enjoyment, Curiosity and Infohunt. The results of this analysis are displayed in Figure 2. The results showed that VR via real video was directly and negatively associated with engagement with trust as a mediator ($B = -0.5621, p < 0.0001, CI = [-0.7062, -0.4181]$). In addition, VR via real video was positively associated with trust ($B = 0.2525, p = 0.0041, CI = [0.0806, 0.4243]$), which in turn was positively associated with engagement ($B = 0.6378, p < 0.0001, CI = [0.5564, 0.7192]$).

Similarly, VR via Real video was directly and negatively associated with Engagement with Enjoyment as a mediator ($B = -0.5181, p < 0.0001, CI = [-0.6588, -0.3774]$). Furthermore, VR via Real video was positively associated with Enjoyment ($B = 0.2059, p = 0.0421, CI = [0.0074, 0.4045]$), which in turn was positively associated with Engagement ($B = 0.5683, p < 0.0001, CI = [0.4991, 0.6375]$).

On the other hand, the results showed that VR via real video was directly and negatively associated with engagement with Curiosity as a mediator ($B = -0.2603, p = 0.0001, CI = [-0.3890, -0.1317]$). Additionally, VR via Real video was negatively associated with Curiosity ($B = -0.1960, p = 0.0291, CI = [-0.3718, -0.0201]$), which in turn was positively associated with Engagement ($B = 0.7183, p < 0.0001, CI = [0.6469, 0.7897]$).

Finally, the results showed that VR via real video was directly and negatively associated with Engagement with Infohunt as a mediator ($B = -0.5405, p < 0.0001, CI = [-0.6895, -0.3914]$). Moreover, VR via Real video was positively associated with Infohunt ($B = 0.1642, p = 0.0078, CI = [0.0434, 0.2850]$), which in turn was positively associated with Engagement ($B = 0.8486, p < 0.0001, CI = [0.7285, 0.9687]$).

The analysis revealed that three out of the four variable Trust, Enjoyment, and Infohunt positively boosted Engagement when mediated by VR via Real video. In contrast, Curiosity exhibited a negative indirect effect on Engagement.

Moderated Mediation Analysis

The moderated mediation model was tested using Model 7 of the SPSS Process macro. As shown in Table 1 and Table 2 the results suggest that the interaction between VR via real video and Digiskill has a significant effect on Infohunt ($\beta = 0.1509, p = 0.0006, CI = [0.0652, 0.2366]$). This implies that Digiskill moderates the relationship between VR via real video and Infohunt. Additionally, the interaction between VR via real video and Adgensen also has a significant effect on Infohunt ($\beta = 0.0980, p = 0.0383, CI = [0.0053, 0.1908]$), indicating that Adgensen moderates the relationship between VR via real video and Infohunt.

Figure 3 and Figure 4 illustrates the moderating effects of Digiskill and Adgensen. For subjects with high levels of Digiskill and Adgensen, the effect of VR via real video on Infohunt was positive and significant: Digiskill ($M + 1SD: \beta = 0.2468, p = 0.0001, CI = [0.1282, 0.3654]$) and Adgensen ($M + 1SD: \beta = 0.2117, p = 0.0016, CI = [0.0808, 0.3425]$). In contrast, for subjects with low levels of Digiskill and Adgensen, the effect of VR via real video on Infohunt was not significant: Digiskill ($M - 1SD: \beta = -0.0479, p = 0.4322, CI = [-0.1676, 0.0718]$) and Adgensen ($M - 1SD: \beta = 0.0176, p = 0.7921, CI = [-0.1133, 0.1484]$). This indicates that the effect of VR via real video on Infohunt strengthens with the increase of Digiskill and Adgensen.

DISCUSSION AND CONCLUSION

With the rapid advancement of AI (artificial intelligence) and VR (virtual reality) technology, the variety of video formats available for advertising has significantly expanded (de Regt et al., 2021). As we strive to create more effective advertisements leveraging these technologies, it becomes crucial to understand their impact on audience engagement. According to our research, virtual videos by themselves are more effective in engaging people, drawing more attention compared to real videos.

Our findings highlight a significant interactive effect between the type of video (virtual or real) and engagement, serving as an important reference for future research. In the context of real videos, we observed that three parameters—Trust, Enjoyment, and Infohunt—positively influence engagement. Real videos are particularly effective in boosting these parameters. This implies that by enhancing these three factors, we can achieve higher engagement through real face videos.

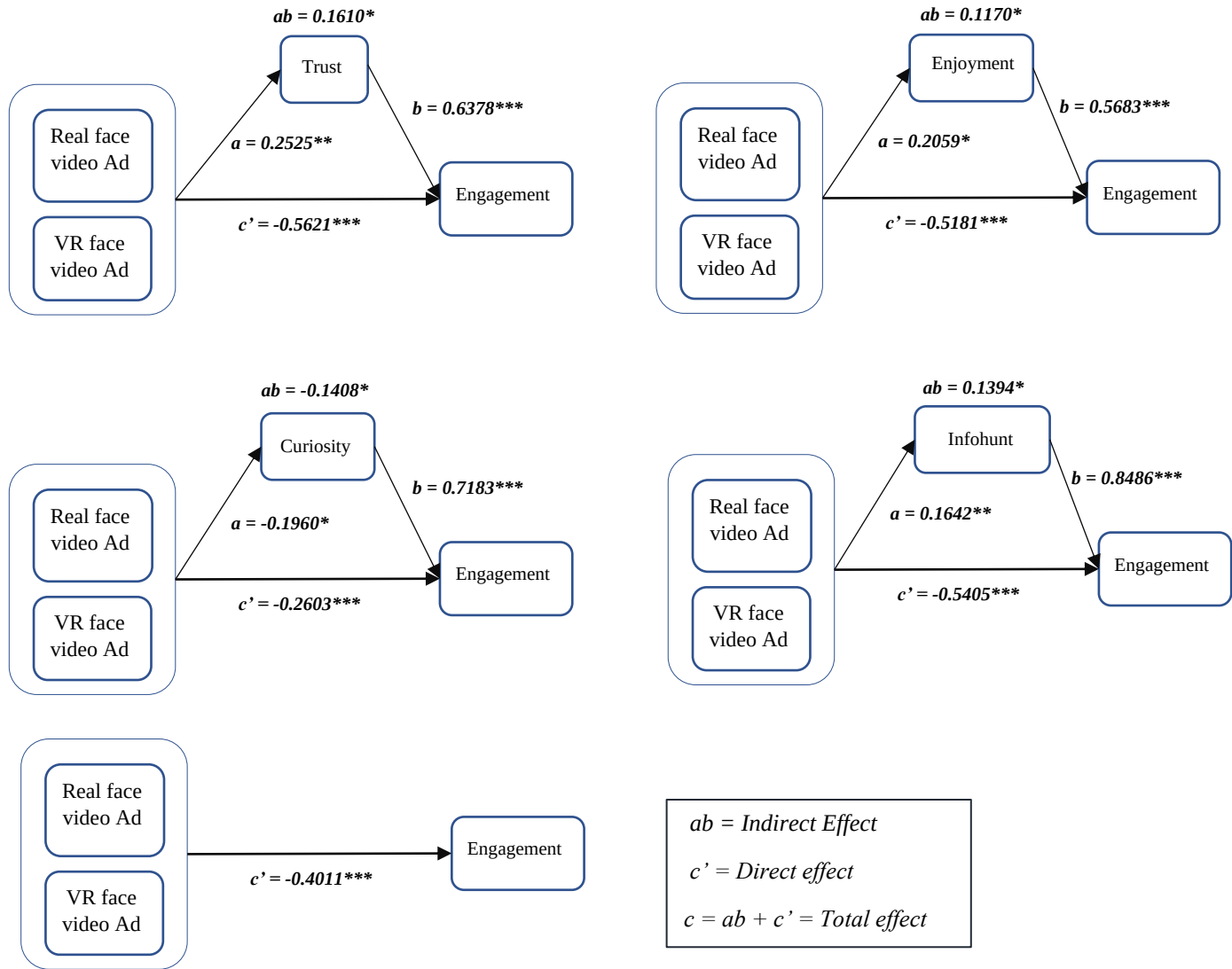


Figure 2: Results of mediation analysis. Note: a , b , c' are unstandardized coefficients. $^*p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$.

Table 1: Mediating-moderating model analysis results, Digiskill as a moderator.

Process	Variables	B	SE	t	p	CI	
						LLCI	ULCI
Effect on Infohunt	constant	2.7985***	0.1258	22.2494	0.0000	2.5513	3.0458
	VR/R	0.0995*	0.0431	2.3057	0.0216	0.0147	0.1843
Moderator	Digiskill	0.3411***	0.0314	10.8618	0.0000	0.2793	0.4028
	VR/R*Digiskill	0.1509***	0.0436	3.4612	0.0006	0.0652	0.2366
	Gender of Actor	0.0726	0.0466	1.5587	0.1199	-0.0190	0.1967
	Age	0.1290***	0.0345	3.7438	0.0002	0.0613	0.1967
	Education	0.0404	0.0360	1.1220	0.2625	-0.0304	0.1111
	Shoes or Air pods	-0.1558***	0.0434	-3.5909	0.0004	-0.2411	-0.0705
Effect on Engagement	constant	0.6042*	0.2813	2.1479	0.0323	0.0512	1.1573

VR/R	-0.5753***	0.0756	-7.6057	0.0000	0.7240	0.4266
Infohunt	0.7670***	0.0652	11.7549	0.0000	0.6387	0.8953
Gender of Actor	-0.0659	0.0801	-0.8225	0.4113	-0.2234	0.0916
Age	0.1671**	0.0612	2.7310	0.0066	0.0463	0.2875
Education	0.1280*	0.0628	2.0384	0.0422	0.0045	0.2514
Shoes or Air pods	-0.0083	0.0770	-0.1072	0.9147	-0.1597	0.1432

Note: N = 403; *p < 0.05, **p < 0.01, ***p < 0.001; based on 5000 bootstrap samples.

Table 2 : Mediating-moderating model analysis results, Adgensen as a moderator.

Process	Variables	B	SE	t	p	CI	
						LLCI	ULCI
Effect on Infohunt	VR/R	0.1146*	0.0474	2.4167	0.0161	0.0214	0.2078
Moderator	Adgensen	0.2975***	0.0343	8.6769	0.0000	0.2301	0.3650
	VR/R*Adgensen	0.0980*	0.0472	2.0790	0.0383	0.0053	0.1908
	Gender of Actor	-0.0696	0.0503	-1.3826	0.1676	-0.1685	0.0294
	Age	0.1081**	0.0384	2.8143	0.0051	0.0326	0.1835
	Education	0.0950*	0.0391	2.4281	0.0156	0.0181	0.1718
	Shoes or Air pods	-0.1794***	0.0476	-3.7658	0.0002	-0.2730	-0.0857
Effect on Engagement	constant	-0.5835	0.2822	2.0676	0.0393	0.0287	1.1382
	VR/R	-0.5794***	0.0758	-7.6465	0.0000	-0.7283	-0.4304
	Infohunt	0.7698***	0.0653	11.7849	0.0000	0.614	0.8982
	Gender of Actor	-0.0600	0.0804	-0.7464	0.4559	-0.2180	0.0980
	Age	0.1686*	0.0612	2.7540	0.0062	0.0482	0.2890
	Education	0.1291**	0.0628	2.0558	0.0405	0.0056	0.2525
	Shoes or Air pods	-0.0122	0.0771	-0.1575	0.8749	-0.1638	0.1395

Note: N = 403; *p < 0.05, **p < 0.01, ***p < 0.001; based on 5000 bootstrap samples.

On the other hand, if the goal is to increase participants' curiosity about a video or product, our research suggests that virtual face videos are more effective than real face videos. We found that virtual face videos have a significant impact on increasing curiosity, and since curiosity positively affects engagement, higher levels of curiosity can lead to greater engagement from participants.

The results of the moderated mediation model indicate that the interaction between VR via real video and both digital literacy and advertisement gender sensitivity significantly influences consumers' willingness to seek information (Infohunt). For participants with high levels of digital literacy and gender sensitivity, VR via real video positively and significantly enhances their willingness to check information before purchasing. As shown in Table 1 and Table 2, age has a positive and significant effect on Infohunt, suggesting that older individuals are more likely to verify product information before making a purchase. Additionally, the type of product, whether shoes or air pods, has a significant negative effect on Infohunt, indicating that search products like air pods significantly influence the likelihood of checking information prior to purchase.

In conclusion, as AI and VR technologies continue to evolve and become more inclusive in their application, these insights provide valuable guidance for optimizing video content to maximize engagement. Virtual videos excel at capturing attention and stimulating curiosity, while real videos are effective in building trust, enjoyment, and the willingness to explore product information. By strategically employing these different types of videos based on the desired outcome, marketers can significantly enhance their advertising effectiveness.

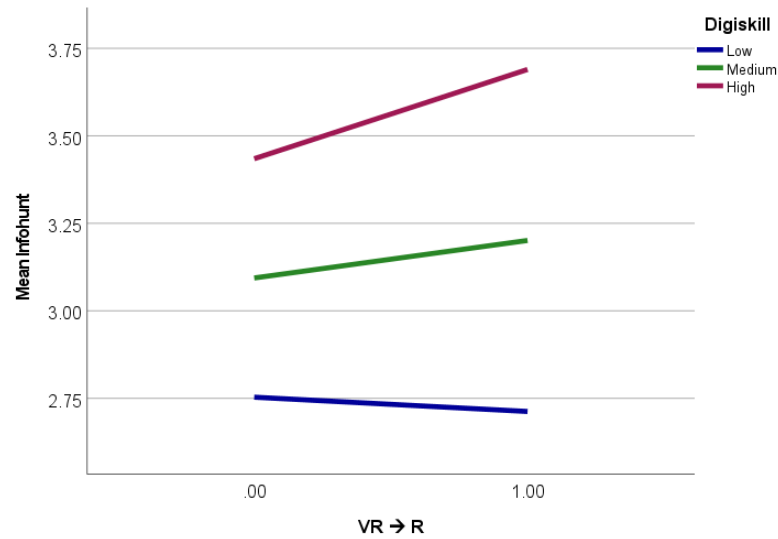


Figure 3: The moderating effect of Digiskill on the relationship between VR/R video and Infohunt.

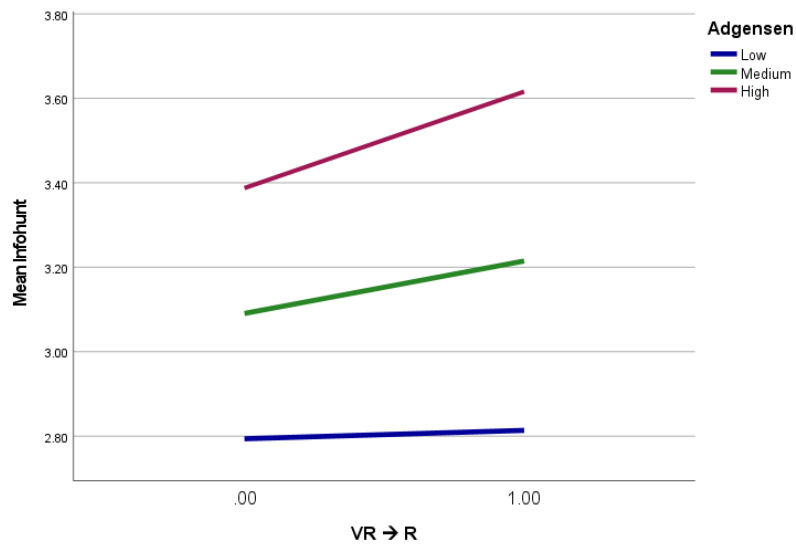


Figure 4: The moderating effect of Adgensen on the relationship between VR/R video and Infohunt.

LIMITATION AND FUTURE DIRECTION

As with all empirical research, this study has some limitations. However, the findings indicate that even in a low-immersive setting, consumers exhibit generally positive outcomes. This suggests a significant potential for enhancing the use of virtual videos over traditional human-made videos in advertising. Future research could explore higher levels of immersion and investigate how different virtual environments impact consumer behavior and engagement. Additionally, examining the long-term effects of virtual advertising and its influence across various demographics and product types would provide a more comprehensive understanding of its efficacy.

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