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The value of augmented reality: exploring hedonic and utilitarian augmented reality experiences

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Abstract

Purpose – The current study explores two distinct augmented reality (AR) experiences (hedonic and utilitarian) to determine the drivers of satisfaction and word-of-mouth (WOM). Specifically, this research investigates how different AR characteristics (person–virtual environment (VE) interaction, novelty) impact reality congruence and immersion, which ultimately lead to satisfaction and WOM.
Design/methodology/approach – We tested the proposed model using a US consumer sample ($N = 401$) by applying partial least squares structural equation modeling (PLS-SEM) to reveal differences across the AR experiences regarding the mediating effects of immersion and reality congruence. Furthermore, we administered PLS-SEM multigroup analysis to identify differences for hedonic and utilitarian AR experiences.
Findings – This study provides important insights into the use of AR to create value-driven consumer experiences and outcome behaviors. Interacting with the virtual environment (VE) enhances immersion for hedonic AR experiences while it leads to higher levels of reality congruence for utilitarian AR experiences. While established relationships such as novelty to immersion continue to be significant, new constructs such as person–VE interaction and reality congruence immerge as stronger influences.
Originality/value – To date, most studies have implemented apps such as IKEA Place and have considered value as one comprehensive construct. However, limited research has examined differences in hedonic and utilitarian AR experiences. The current findings enhance the understanding of utilizing value-driven consumer experiences within the AR context to achieve desirable outcome behaviors.

Keywords Hedonic experiences, Utilitarian experiences, Augmented reality, AR, Reality congruence, Word-of-mouth (WOM), PLS

Paper type Research paper

1. Introduction

The upward trend of digital transformation has strong implications on marketing strategies, in terms of importance of value propositions, value creation and customer experiences (Hoyer *et al.*, 2020; Krey *et al.*, 2023). In contrast to virtual reality (VR), augmented reality (AR) apps place immersive digital information onto users' direct field of vision (Barhorst *et al.*, 2021; Chen *et al.*, 2024). As such, the real environment remains fully visible, and users are not isolated from the real world (Rauschnabel, 2021). In this way, AR is a powerful marketing tool because it provides a digitally enhanced reality, rather than disconnecting users from reality (Chen *et al.*, 2024; Jayaswal and Parida, 2023; Sung, 2021). Rauschnabel *et al.* (2022) defined AR marketing as a strategic integration of AR experiences that can be combined with other media. The goal of AR marketing is to create value for brands, stakeholders and society. For that reason, AR is increasingly being used as part of a balanced marketing strategy and has been praised as a tool to improve strategic brand loyalty and drive digital transformation (Rauschnabel *et al.*, 2022).

Various AR experiences have been introduced by companies with varying levels of complexity and features. The first AR applications were used to create a "wow" factor delivering static videos and basic content, often leaving the bad taste of a marketing gimmick;

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however, today's companies start to recognize the power of immersive storytelling through interactive well-designed content. Examples of AR experiences include ModiFace, a virtual makeover tool used by make-up and cosmetic brands. This type of technology has also been used in virtual mirrors, now found in many beauty stores, to enhance in-store experiences through AR. Overall, these AR experiences assist consumers in completing purchase decisions (Huang and Liao, 2017). In contrast, other apps have been designed to create enjoyable and engaging brand experiences such as face filters (Javornik *et al.*, 2022). These different types of AR applications generate different user and behavioral outcomes; however, this does not always relate to the intended marketing strategy. Often, AR is employed as a fun tool rather than a well-thought addition to the overall marketing strategy falling short of creating value-added consumer experiences (e.g. utilitarian, hedonic).

The current study is rooted in the utilitarian-hedonic approach (Akdim *et al.*, 2022; Flavián *et al.*, 2022; Liu *et al.*, 2020). Introduced by Babin *et al.* (1994) in the early 90s, hedonic and utilitarian motivations are part of shopping experiences. The utilitarian-hedonic approach is needed to better understand consumer behavior and value creation in AR environments (Liu *et al.*, 2020), as consumers' utilitarian and hedonic motivations strongly affect what kind of experiences and environment they seek (Demoulin and Willems, 2019).

While both dimensions of value have received ample attention within the last 20 years (Babin and Krey, 2020; Picot-Coupey *et al.*, 2021), research within the AR marketing context is limited and should explore these conditions independently (Rauschnabel *et al.*, 2019). Akdim *et al.* (2022), looking at the social media context, agreed that usage behavior needs to be considered multi-dimensional and therefore research should explore utilitarian and hedonic motivations. For example, IKEA's Place AR application (app) [1] allows customers to position augmented furniture into their homes, thus creating utilitarian benefits. In contrast, Lego [2] creates hedonic experiences using AR to bring products to life through interactive features and gaming. The enhancement of customer experiences via these types of AR applications is receiving increased attention (e.g. Alimamy and Nadeem, 2022; Riar *et al.*, 2023). Further research is necessary to identify potential differences or similarities of drivers and outcomes of hedonic and utilitarian experiences in this new environment compared to traditional environments, such as in-store, online or apps (Picot-Coupey *et al.*, 2021).

Rooted in the utilitarian-hedonic approach, our study makes three contributions to the field of AR marketing:

(1) To test hedonic and utilitarian AR experiences to explore the differences and commonalities with regards to consumer behavior.

(2) To determine the AR drivers of satisfaction and word-of-mouth (WOM).

(3) To examine novel, low-cost AR apps to enhance generalizability and understanding of AR experiences (Alimamy and Al-Imamy, 2022; Sung, 2021).

Specifically, this research investigates how different AR characteristics (person–virtual environment (VE) interaction, novelty) impact reality congruence and immersion, which ultimately lead to satisfaction and WOM.

Furthermore, following the introduction and theoretical justification of the paper, we will present literature exploring the use and experiences of AR in marketing and beyond. Next, the research model and hypotheses are presented before discussing the methodology. Thereafter, the analysis and results including a comparison of the AR utilitarian value (AR-UV) experience and AR hedonic value (AR-HV) experience are presented. Finally, the conclusion, implications and limitations are discussed.

2. Literature review

Babin *et al.* (1994) explored that shopping activities and overall consumption of products and services result in utilitarian and hedonic consequences. Their research introduced the

perceived shopping value scale, differentiating between HV and UV as major outcomes of consumption experiences (Picot-Coupey *et al.*, 2021). Following this research, there have been ample marketing studies exploring utilitarian and hedonic motivations from a value perspective (Vieira *et al.*, 2018). UV refers to the extrinsic motivation of performing an action, such as gaining benefits in terms of convenience in information retrieval and seeking (Chiu *et al.*, 2014). In contrast, HV is defined as an intrinsic motivation, leading to experiences perceived as enjoyment-oriented, fun and exciting (Sharma *et al.*, 2020). HV brings information to life and increases motivation to engage with as well as retrieve information (Mittal *et al.*, 2020). Hedonic AR experiences are common in entertainment, cultural heritage and educational contexts. Here, AR is used to enhance experiences through an engaging and interactive approach (tom Dieck and Han, 2021).

Existing research in the AR marketing field has applied theories such as the technology acceptance model (TAM), stimulus-organism-response (SOR) theory or uses and gratification theory (i.e. Hamari *et al.*, 2019; Hwang *et al.*, 2023; Jiang and Lyu, 2024). However, often these theories explored well-established dimensions of marketing, user acceptance and behaviors. According to Javeed *et al.* (2024), there is a need for new theoretical lenses to understand and explore AR-specific emerging themes. A recent stream of research identified the importance of focusing on the utilitarian-hedonic approach. Hereby, research aims to explore the differences between utilitarian and hedonic experiences with the aim to inform successful application design, implementation and uptake (i.e. Akdim *et al.*, 2022). Identifying context-specific antecedents and behavioral outcomes such as WOM were among the key recommendations for future research (Akdim *et al.*, 2022).

3. Proposed model

3.1 Person–VE interaction and novelty

Person–VE interaction is a relatively new concept that has received limited attention within previous research. Considering AR's characteristics of digitally blending content into users' direct field of vision, it is an immensely important construct for AR marketing research. It is grounded in servicescape and experiencescape literature which reflects the ability of customers to interact and engage with the consumption environment (Hudson *et al.*, 2019). Regarding digital technologies such as AR, virtual experiencescapes encompass the physical, as well as the virtual, experience mediated by a digital interface (Hudson *et al.*, 2019). As such, we posit that the interaction of the consumer with the virtual environment (VE) is a critical component of AR.

To date, person–VE interaction has been studied as an influencing factor on consumers' perceived immersion (e.g. Hudson *et al.*, 2019). Heller *et al.* (2021) referred to the person–VE interaction concept as spatial presence (the perceived tangibility of the experience) and supported it leading to cognitive and emotional engagement. Similarly, according to Hudson *et al.* (2019), consumers' interaction with virtual objects enhanced immersion, in which an increase in interactive features is directly linked to the perceived degree of immersion. For example, AR experiential marketing apps such as IKEA allow users to place over 2,000 furniture models in their own homes, which not only saves customers time, but enhances brand awareness and perceived value of products (Chen *et al.*, 2022). In this study, we argue that person–VE interaction creates an enhanced sense of reality congruence – the degree of augmented quality (see below) (c.f. Kumar, 2022). In the e-marketplace context, Yoo *et al.* (2015) supported the link between the degree of interactivity to perceived information quality. When consumers perceive an AR experience to be interactive with the freedom to move around the VE, it is believed to strongly influence both the sense of feeling immersed in the experience, as well as a perception of quality of the virtually enhanced real environment.

H1a. Person–VE interaction positively influences reality congruence.

H1b. Person–VE interaction positively influences immersion.

AR has long been considered an innovative technology; however, it is becoming more widely used within the business and marketing landscape (Rauschnabel *et al.*, 2022). Nonetheless, AR applications and use cases are still developing, hence AR continues to be considered a new marketing approach due to limited research and a sparse number of recent use cases (Saleem *et al.*, 2022). Novelty is associated with something new, distinctive, fresh and unfamiliar (Barhorst *et al.*, 2021). Within their qualitative research on AR smart glasses, tom Dieck *et al.* (2016) found them to be innovative, fresh and exciting.

Jessen *et al.* (2020) reiterated that novelty within the AR context does not necessarily refer to AR being a "new" application and technology, but users being provided with unusual and new ways to engage. Uhm *et al.* (2022) agreed that AR is a useful tool when introducing innovative products with unfamiliar features or characteristics. More recently, AR novelty has been linked to increased levels of immersion (Yim *et al.*, 2017). In addition, Oyman *et al.* (2022) supported that novelty seeking influences perceived AR referring to the concept of reality congruence. Based on the aforementioned discussion we propose:

H2a. Novelty positively influences reality congruence.

H2b. Novelty positively influences immersion.

3.2 Reality congruence

Kumar *et al.* (2024) developed a taxonomy of AR marketing whereby they identified reality congruence as one of the key AR marketing attributes. Reality congruence encompasses the fit between virtual and real products. It reflects the presentation of the virtual content, its vividness, visual appeal and attractive provision of information (Kowalczuk *et al.*, 2021). Within AR marketing, businesses aim to achieve a realistic representation of actual products and services to evoke feelings similar to those experienced during shopping in-person (Jayaswal and Parida, 2023; Rauschnabel *et al.*, 2019). Overall, AR aims to create a sense of "realness" and therefore reality congruence should be one of the critical factors in any marketing study. Within the AR retailing context, Xu *et al.* (2024) argued that reality congruence influences consumers' cognitive assimilation and positive affection. The employment of varied terminology to express a singular concept exacerbates confusion and underscores the necessity for additional investigation into the concept of reality congruence.

For instance, Kumar (2022) referred to it as augmented quality and supports its influence on perceived value within the AR retailing context. Furthermore, Poushneh (2018) and Rauschnabel *et al.* (2019) introduced the concept as augmentation quality. The attractiveness of design and information has also been referred to as esthetics within the concept of experience economy (e.g. Lee *et al.*, 2020). According to Ramdani *et al.* (2022), reality congruence of AR applications significantly increased users' perception of functional benefits (e.g. efficiency, convenience). Considering the importance of using a utilitarian-hedonic approach to fully understand consumer behavior as discussed by Demoulin and Willems (2019), research incorporating reality congruence has been limited. Sun *et al.* (2022) claimed realistic product displays in AR reduce the risks of product quality uncertainty by providing perceived informativeness, which clearly links it to the importance for utilitarian experiences. Song *et al.* (2019) discussed the concept of environmental embedding within AR (e.g. I was able to see how the watch looked on my wrist/I felt I wore this watch on my wrist) and confirmed a strong influence on immersion. Hence, the more realistic an AR experience is perceived to be, the stronger the sense of immersion experience by its users, thus, we propose:

H3. Reality congruence positively influences immersion.

Although still relatively unexplored, based on discussions from previous literature we propose that reality congruence strongly influences behavioral outcomes. Behavioral outcomes can be measured by multiple concepts, some of them go beyond actual buying behaviors such as

WOM (i.e. Honora *et al.*, 2024) or satisfaction (i.e. Kim *et al.*, 2012; Liu *et al.*, 2020; Lucia-Palacios *et al.*, 2020).

For instance, Poushneh (2018) supported that augmentation quality significantly increases user satisfaction. In addition, the design of experiences can also influence consumers' WOM (Zhang *et al.*, 2021). Translating this into the context of the current study, reality congruence can be linked to creating more satisfying and loyal (e.g. WOM) experiences. Thus, we propose:

H4a. Reality congruence positively influences satisfaction.

H4b. Reality congruence positively influences WOM.

3.3 Immersion, satisfaction and WOM

According to Witmer and Singer (1998), immersion is a psychological state that involves someone to be enveloped by an environment of constant stimulation and experiences. AR is continuously evolving toward ever more immersive experiences. Both headsets and apps aim to create a high degree of immersion to increase value across the customer journey (tom Dieck and Han, 2021). The concept of immersion involves escaping reality, detaching from the real world and forgetting about everyday concerns (Hudson *et al.*, 2019). The more realistic AR experiences become, the more likely consumers feel fully immersed, which in turn influences their experience (tom Dieck and Han, 2021).

Bae *et al.* (2020) found that within a branding context, immersion positively influences satisfaction when using mixed reality experiences. In another immersive technology context, Wu *et al.* (2020) identified that a strong degree of immersion influences tourists' experiential VR satisfaction. Consequently, consumers who felt a sense of entering a different world and fully immersing themselves in experiences tend to be more satisfied. Interestingly, some studies came to different conclusions and argued that this is highly context as well as application specific. For instance, Li *et al.* (2023) studied the tourism context and failed to find a significant influence from immersion to satisfaction. One argument for this could be the design of experiences and lack of immersive elements will influence the degree of consumer satisfaction. This means that although the paths from immersion to satisfaction seems to be well established as discussed above, it is necessary to incorporate and confirm the importance within the AR marketing context, especially considering that research has long argued that the degree of immersion highly influences the success of application design (Balapour *et al.*, 2023). Thus, we propose the following hypothesis:

H5a. Immersion positively influences satisfaction.

Within the context of mobile gaming, Zhou *et al.* (2022) could not confirm a significant effect of immersion toward behavioral intentions and argued that immersive features in applications are often complex and multi-faceted. Nonetheless, flow, the degree of how far a consumer is immersed in an experience, has often been found to strongly influence consumers' intention to spread WOM (e.g. Quach *et al.*, 2022). Their study on shopping experiences found that highly immersed consumers entered a state of flow that led them to engage with positive WOM. Therefore, we propose the following hypothesis:

H5b. Immersion positively influences WOM.

3.4 Moderation: utilitarian versus hedonic AR experiences

As discussed above, consumers develop different feelings and perceptions about an experience based on the context they are experiencing (Akdim *et al.*, 2022). For instance, hedonic experiences are concerned with intrinsic motivation, leading to experiences perceived as enjoyment-oriented, fun and exciting (Picot-Coupey *et al.*, 2021). This includes elements of real-time experiences that incorporate features such as playfulness to trigger users' rational

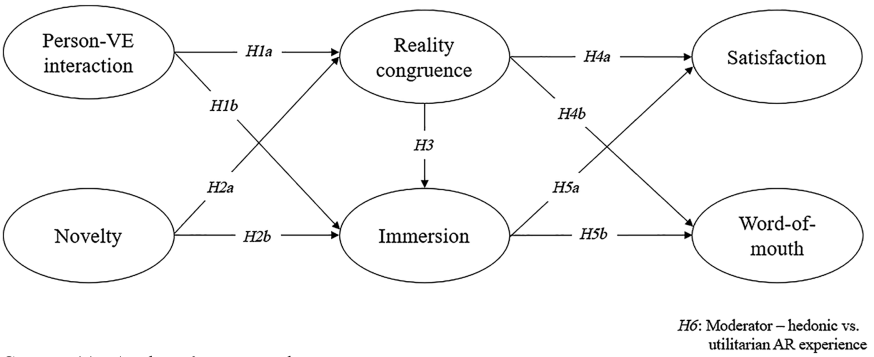
and emotional responses, i.e. user engagement (Saleem *et al.*, 2022). In the retail context, Hilken *et al.* (2017) proposed AR interactions positively influence customers' satisfaction and hedonic perceptions of online service experiences. Overall, AR increases experiential enjoyment in consumption experiences, such as the ability to access enhanced information or explore more visually engaging content. Therefore, AR can elevate the online experience (Hilken *et al.*, 2017).

Utilitarian experiences are concerned with extrinsic motivation of performing an action, such as gaining benefits in terms of convenience in information retrieval and seeking (Picot-Coupey *et al.*, 2021). Jessen *et al.* (2020) reported that AR is increasingly being used in the early stages of gathering information. Applications such as Sephora Virtual Artist App [3] or Wanna Kicks all focus on providing consumers with enhanced information and experiences to make an informed, efficient purchase decision (Rauschnabel *et al.*, 2019). As such, these technologies provide UV as part of the consumption experience. Compared to other digital technologies, AR can be easily integrated into users' daily lives and shopping behaviors because of ubiquitous smartphone technologies. Therefore, it is easily accessible to a large number of consumers, adding value to their customer journey through an overlay of realistic, relevant and in-time information (Barhorst *et al.*, 2021; Sung, 2021).

Putting this into perspective, it is anticipated that the effects from the perceived tangibility of the experience (person–VE interaction) and the feeling of experiencing something new (novelty) toward reality congruence and immersion and ultimately satisfaction and WOM vary according to the context (hedonic/utilitarian) of the AR experience (c.f. Akdim *et al.*, 2022). Thus, we propose the following hypothesis:

H6. The modeled relationships are moderated by different AR value experiences (utilitarian vs hedonic).

This study therefore proposes a comprehensive model that investigates how different AR characteristics (person–VE interaction, novelty) impact reality congruence and immersion, which ultimately lead to satisfaction and WOM (Figure 1). These relationships are proposed for two AR experiences: AR-UV and AR-HV. Based on extant literature, the constructs were chosen to bridge the gap of under-researched AR value characteristics. For example, Zanger *et al.* (2022) found that although affective responses improved WOM, AR does not guarantee more positive affective responses as it heavily depends on technical AR features. The current study examines person–VE interaction, reality congruence and immersion as part of technical AR features. Moreover, to date, studies have failed to examine these characteristics holistically to determine their impact on different AR experiences (e.g. hedonic vs utilitarian). Thus,



Source(s): Authors' own work

Figure 1. Conceptual model

additional research confirming the impact of these AR features on WOM is necessary for more conclusive findings.

Considering satisfaction, Kim *et al.* (2021) positioned AR as enabling brands to deliver additional value, including novelty, which in turn shapes customer satisfaction. The research further posits that a brand's innovative use of novel technologies positively impacts their satisfaction, immersion and WOM. In addition, Chen *et al.* (2022) added novelty as a key component of the extended customer experience to measure perceptions of AR apps. Overall, satisfaction and WOM remain important variables within marketing and especially recent literature explores these two constructs as dependent variables (Zalloum *et al.*, 2019).

4. Methodology

4.1 Data collection and procedure

The research procedure involved online surveys in the USA administered by Prolific. Participants had to be US citizens and over the age of 18. Upon accessing the survey, participants were randomly assigned to and only engaged with one of the AR experiences (hedonic vs utilitarian; see Appendix). The randomization was completed in Prolific.

Participants were able to access the survey via any device including laptops, desktops and smartphones. Data collection took place over a two-week period and the average survey completion time was between 9 and 10 min. Once participants started the survey, they were asked to engage with their AR app for around 30 s. The AR-UV experience included a utilitarian AR app called Wanna Kicks [4], a virtual shoe allowing participants to try-on and review information and choice of green sneakers. The AR-HV experience featured a hedonic AR app called ARVid [5]. During this experience, a deer appeared, made noises, and moved around in the user's direct surroundings. These two applications were chosen as they had distinctive features in terms of providing utilitarian and hedonic content as confirmed by statistical analysis (see section 5.3). Specifically, the Wanna Kicks offered information facilitating the decision-making process and ARVid offered an enjoyable, fun experience. Comparable methods have been used in other AR marketing studies, including asking participants to choose a dessert from an AR menu and showing AR vs non-AR videos (Barhorst *et al.*, 2021; Heller *et al.*, 2021).

After engaging with their AR app, participants returned to the online survey to answer questions regarding their AR experiences, constructs of interest and demographics. Attention checks were placed throughout the survey. For the AR-UV experience, participants had to correctly identify the type of product used in the experience and the primary color. For the AR-HV experience, participants were asked to identify the object depicted in the experience and the specific animal. These attention checks ensured that participants were fully engaged and provided valid survey responses. Participants who did not pass the attention checks were removed from the sample.

Upon removing failed attention checks (11) and incomplete surveys (24), the final data set included 401 responses (54.1% female) that completed either the AR-UV or AR-HV experience. On average, participants were 35 years old (SD = 12.1) and have experienced AR before (M = 4.7, SD = 1.6). For the multi-group analysis, the total data set was separated by AR experience creating two distinct subsamples, i.e. participants completing the AR-UV experience versus the AR-HV experience. A total of 195 participants completed the AR-UV experience. Participants were mainly female (54.4%) with an average age of 35 (SD = 12.1). In addition, most participants identified as Caucasian (66.2%), were employed full-time (44.6%) and have experienced AR before (77.4%). For the AR-HV experience, 206 participants completed this experience. Participants were mainly female (53.9%), had an average age of 35 (SD = 12.1) and identified as Caucasian (63.1%). In addition, most participants worked full-time (47.6%) and had previous AR experiences (78.2%). Overall, both samples were comparable and representative of the US population (Census, 2021).

4.2 Measures

To test the conceptual models, several measures were identified from prior literature and adapted to the current AR experiences. All of these items were previously used and validated in studies related to technology usage or AR. Specifically, respondents indicated their level of immersion (Hudson *et al.*, 2019), reality congruence (Kowalczuk *et al.*, 2021), novelty (Barhorst *et al.*, 2021), person–VE interaction (Hudson *et al.*, 2019), satisfaction (Rezaei and Valaei, 2017) and WOM (Hilken *et al.*, 2017; Smink *et al.*, 2020). All items were measured on a seven-point Likert scale (see Table 1).

4.3 Analysis

We employed partial least squares structural equation modeling (PLS-SEM) to estimate the proposed relationships using *SmartPLS 3* (Ringle *et al.*, 2015). Next, we utilized multi-group analysis (PLS-MGA) to examine potential differences between the AR-UV and AR-HV experiences. Lastly, a robustness check assessed high versus low value conditions for each AR experience. PLS-SEM was the preferred analytical approach due to the exploratory nature of the study, the optimized prediction of dependent variables, small sample sizes for each AR experience comparing high versus low value, and the assessment of PLS-MGA via permutation test (Akdim *et al.*, 2022; Barhorst *et al.*, 2023). We applied the commonly used *p*-value of less than 0.05 to indicate significance and *p*-value larger than 0.50 to indicate marginal significance (Hair *et al.*, 2019).

4.4 Common method bias

As the collected data reflected self-reported measures, the influence of common method variance was minimized by separating predictor and criterion variables in the survey and ensuring respondent's anonymity (Podsakoff *et al.*, 2003). Furthermore, we performed Harman's single-factor test (Podsakoff *et al.*, 2003) and a full collinearity test based on variance inflation factors (Kock, 2015). Harman's single-factor test showed that no single factor accounted for more than 35% of the total variance which is below the acceptable threshold of 50% (Podsakoff *et al.*, 2003). Based on Kock (2015), all variance inflation factor scores were below 2.20 indicating that the model can be considered free of common method bias. The procedural and statistical steps indicate no presence of common method bias.

5. Results

5.1 Measurement model assessment

Measurement model assessment includes the evaluation of internal consistency, indicator reliability and validity of reflective constructs (Barhorst *et al.*, 2023; Hair *et al.*, 2019). For the total sample, all outer loadings load on their corresponding constructs and are significant ($p < 0.05$). Next, composite reliability (CR) values range between 0.865 and 0.959, exceeding the common threshold of 0.70 for the total sample (see Table 1). All average variance extracted (AVE) values are 0.686 or higher and are above the established cut-off value of 0.50 for the total sample. Subsequently, results validate the measurement model's internal consistency and convergent validity.

Discriminant validity assessment for the total sample draws on the heterotrait-monotrait (HTMT) ratio of correlation method (Hair *et al.*, 2019). All HTMT ratios are lower than the conservative threshold of 0.85 (Hair *et al.*, 2019). In addition, none of the HTMT confidence intervals include 1 (Table 2). Furthermore, all squared construct correlations are smaller than the corresponding AVEs providing additional support based on the Fornell–Larcker criterion (Fornell and Larcker, 1981; Krey *et al.*, 2023). Overall, all results confirm discriminant validity of the measurement model.

Table 1. Measurement model results

Constructs and items	Total sample				AR hedonic value experience				AR utilitarian value experience			
	Loadings	α	CR	AVE	Loadings	α	CR	AVE	Loadings	α	CR	AVE
Person–VE interaction (Hudson *et al*., 2019)		0.919	0.948	0.860		0.920	0.949	0.862		0.891	0.932	0.821
Thinking about the AR experience, I felt free to												
Interact with the environment in the AR experience	0.929				0.930				0.907			
Explore and look where I wanted	0.920				0.913				0.916			
Move around in the environment	0.932				0.943				0.895			
Novelty (Barhorst *et al*., 2021)		0.894	0.925	0.756		0.917	0.940	0.798		0.858	0.901	0.698
This AR experience was a new experience for me	0.850				0.875				0.785			
This AR experience was a unique experience for me	0.923				0.933				0.905			
This AR experience was a different experience for me	0.922				0.926				0.916			
This AR experience was an unusual experience for me	0.774				0.836				0.718			
Reality congruence (Kowalczuk *et al*., 2021)		0.948	0.959	0.795		0.948	0.959	0.796		0.926	0.942	0.732
The AR app presents virtual content impressively	0.896				0.904				0.853			
Overall, I find that the AR app presents virtual content attractively	0.921				0.935				0.886			
The design of the virtual content is visually pleasant	0.901				0.902				0.885			
The AR app presents virtual content visually appealingly	0.932				0.931				0.912			
The AR app presents the design of the virtual content realistically	0.846				0.827				0.809			
The AR app presents virtual content as if it was real	0.848				0.848				0.781			
Immersion (Hudson *et al*., 2019)		0.773	0.865	0.686		0.825	0.895	0.740		0.751	0.853	0.667
I could interact with the content in the AR experience as if I was in the real world	0.886				0.859				0.904			
I felt completely immersed	0.923				0.917				0.917			
I forgot about my everyday concerns	0.650				0.800				0.585			

(*continued*)

Constructs and items	Total sample				AR hedonic value experience				AR utilitarian value experience			
	Loadings	α	CR	AVE	Loadings	α	CR	AVE	Loadings	α	CR	AVE
Satisfaction (Rezaei and Valaei, 2017)		0.939	0.953	0.804		0.940	0.955	0.808		0.933	0.949	0.788
Dissatisfied – satisfied	0.910				0.911				0.901			
Displeased – pleased	0.927				0.907				0.942			
Unfavorable – favorable	0.928				0.938				0.907			
Frustrated – content	0.855				0.847				0.859			
Terrible – delighted	0.860				0.888				0.824			
WOM (Hilken *et al*., 2017; Smink *et al*., 2020)		0.918	0.941	0.801		0.939	0.956	0.845		0.893	0.925	0.756
I would like to talk about this AR experience with friends, family or colleagues	0.907				0.904				0.902			
I would recommend this AR experience to someone who seeks my advice	0.923				0.934				0.912			
Share content from this AR experience via social media	0.829				0.905				0.757			
Share content from this AR experience with a friend	0.918				0.933				0.897			

Note(s): CR = Composite reliability; AVE = Average variance extracted
Source(s): Authors' own work

Table 2. Discriminant validity assessment

	Person-VE interaction	Novelty	Reality congruence	Immersion	Satisfaction	WOM
Person–VE interaction	*0.927*	0.389	0.582	0.628	0.600	0.660
Novelty	0.406 [0.29; 0.50]	*0.870*	0.406	0.423	0.386	0.406
Reality congruence	0.621 [0.56; 0.69]	0.418 [0.32; 0.51]	*0.891*	0.627	0.677	0.622
Immersion	0.693 [0.62; 0.76]	0.470 [0.38; 0.57]	0.688 [0.62; 0.75]	*0.829*	0.598	0.679
Satisfaction	0.636 [0.56; 0.71]	0.393 [0.29; 0.49]	0.708 [0.66; 0.77]	0.662 [0.56; 0.79]	*0.897*	0.630
WOM	0.706 [0.64; 0.77]	0.417 [0.31; 0.52]	0.652 [0.59; 0.71]	0.772 [0.72; 0.83]	0.663 [0.57; 0.73]	*0.895*

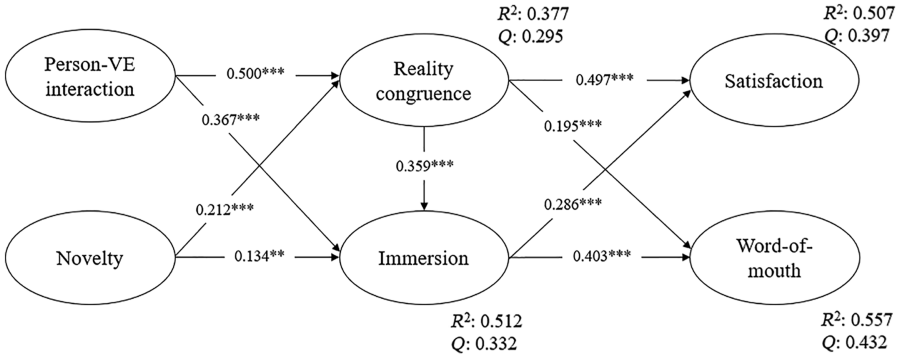
Note(s): Main diagonal ($\sqrt[2]{AVE}$) in italic and upper triangular matrix (Pearson correlation) present the Fornell–Larcker criterion. The lower triangular matrix presents the heterotrait-monotrait (HTMT) ratio of correlations and confidence intervals
Source(s): Authors' own work

5.2 Structural model

Before examining the structural model relationships, variance inflation factors (VIF) of predictor constructs are examined for the total sample. All VIF values range between 1.26 and 2.15 indicating no issues with collinearity as values do not exceed 5 (Hair *et al.*, 2019). Looking at the variance explained in each endogenous construct (R^2) (Hair *et al.*, 2019), the model explains 55.7% of WOM followed by satisfaction, immersion and reality congruence (Figure 2).

The structural model assessment includes one-tailed tests with 5,000 bootstrap subsamples (Hair *et al.*, 2019). Results indicate that structural relationships express significance and importance through the magnitude of their standardized values (Figure 2). Considering the effect sizes (f^2) of relationships, all values indicate large and medium effects (Krey *et al.*, 2023). The two largest effect sizes are from person–VE interaction to reality congruence ($f^2 = 0.341$) and reality congruence to satisfaction ($f^2 = 0.305$). In contrast, novelty to immersion ($f^2 = 0.030$) has the smallest effect size.

Regarding the hypothesized relationships, results support all proposed hypotheses (Figure 2). In line with H1a and H1b, person–VE interaction positively affects reality



Note(s): *$p < 0.1$; **$p < 0.05$; ***$p < 0.001$
Source(s): Authors' own work

Figure 2. Structural model results

congruence ($\beta = 0.500$, $p < 0.001$) and immersion ($\beta = 0.367$, $p < 0.001$). In addition, novelty impacts reality congruence ($\beta = 0.212$, $p < 0.001$) and immersion ($\beta = 0.134$, $p < 0.05$) confirming H2a and H2b, respectively. Supporting H3, reality congruence positively influences immersion ($\beta = 0.359$, $p < 0.001$). Next, reality congruence has a positive impact on satisfaction ($\beta = 0.497$, $p < 0.001$) and WOM ($\beta = 0.195$, $p < 0.001$). Therefore, H4a and H4b are supported. Lastly, H5a and H5b are confirmed as immersion influences satisfaction ($\beta = 0.286$, $p < 0.001$) and WOM ($\beta = 0.403$, $p < 0.001$).

Finally, PLSPredict with 10-fold and 10 replications is applied to examine predictive relevance of the model (Hair *et al.*, 2019). Since all Q^2 values exceed zero for the endogenous constructs, the model's predictive accuracy is confirmed (Figure 2). The root mean squared error (RMSE) values of endogenous constructs express smaller values for the PLS-SEM method compared to the linear regression approach. Overall, predictive power is confirmed again.

5.3 Multi-group analysis

To analyze potential differences of AR-HV and AR-UV experiences (H6), we implement PLS-MGA. We utilize the measurement invariance of composite models (MICOM) method to examine invariance patterns (Barhorst *et al.*, 2023).

Prior to completing the analysis, we conducted an independent *t*-test to assess the level of UV and HV elicited in each AR experience based on manipulation check questions. Results confirm that UV significantly differs across the two experiences ($t = 6.69$, df = 399, $p < 0.001$). Participants expressed higher levels of UV in the AR-UV (M = 4.9) compared to the AR-HV experience (M = 3.9). In addition, HV also significantly differs across the two experiences ($t = 2.92$, df = 399, $p < 0.05$) with participants expressing higher levels of HV in the AR-HV (M = 4.4) compared to AR-UV experience (M = 3.9).

5.3.1 Measurement invariance. MICOM assessment includes examining configural invariance, compositional invariance and equality of composite mean values and variances (Henseler *et al.*, 2016). Administering identical indicators, treatment of indicator data and algorithm settings in both AR experiences established configural invariance. Compositional invariance is examined via c values as coefficients for indicator effectiveness. All c values are close to 1 and within the 95% confidence intervals; therefore, compositional invariance is established. Lastly, equality of composite mean values and variances are examined. Since not all composite mean values and variance ratio differences are non-significant and some values do not fall between the confidence intervals, MICOM supports partial invariance (Henseler *et al.*, 2016).

5.3.2 Results. PLS-MGA results are summarized in Table 3. Results confirm no differences between AR-HV and AR-UV experiences regarding the influence of novelty on immersion ($\beta_{AR\text{-}HV} = 0.089$, $\beta_{AR\text{-}UV} = 0.188$, $p > 0.1$) and on reality congruence ($\beta_{AR\text{-}HV} = 0.280$, $\beta_{AR\text{-}UV} = 0.149$, $p > 0.1$) or reality congruence on immersion ($\beta_{AR\text{-}HV} = 0.347$, $\beta_{AR\text{-}UV} = 0.409$, $p > 0.1$), satisfaction ($\beta_{AR\text{-}HV} = 0.449$, $\beta_{AR\text{-}UV} = 0.565$, $p > 0.1$) and WOM ($\beta_{AR\text{-}HV} = 0.179$, $\beta_{AR\text{-}UV} = 0.234$, $p > 0.1$). For immersion, its influence on WOM ($\beta_{AR\text{-}HV} = 0.439$, $\beta_{AR\text{-}UV} = 0.334$, $p > 0.1$) does not differ across experiences; however, its influence on satisfaction is marginally significant and stronger for hedonic AR experiences ($\beta_{AR\text{-}HV} = 0.350$, $\beta_{AR\text{-}UV} = 0.182$, $p < 0.1$). In addition, a stronger relationship is evident for AR-HV experiences for person–VE interaction's influence on immersion ($\beta_{AR\text{-}HV} = 0.347$, $\beta_{AR\text{-}UV} = 0.212$, $p < 0.05$) indicating the importance of eliciting immersion while interacting with VEs. Furthermore, person–VE interaction has a stronger relationship with reality congruence ($\beta_{AR\text{-}HV} = 0.339$, $\beta_{AR\text{-}UV} = 0.587$, $p < 0.05$) for AR-UV experiences. Therefore, H6 is partially supported.

5.3.3 Robustness check. To further examine potential differences between AR-HV and AR-UV experiences, we compare high versus low levels of UV and HV for each experience using PLS-MGA (see Table 4). For the AR-UV experience, a stronger relationship is evident in the low UV condition for the influence of person–VE interaction on reality congruence

Table 3. Multi-group test results

Paths	Standardized estimate (AR-HV)	Standardized estimate (AR-UV)	Difference
Person–VE interaction → Reality congruence	0.339	0.587	-0.248^{**}
Person–VE interaction → Immersion	0.347	0.212	0.226^{**}
Novelty → Reality congruence	0.280	0.149	0.131^{ns}
Novelty → Immersion	0.089	0.188	-0.100^{ns}
Reality congruence → Immersion	0.347	0.409	-0.063^{ns}
Reality congruence → Satisfaction	0.449	0.565	-0.116^{ns}
Reality congruence → WOM	0.179	0.234	-0.055^{ns}
Immersion → Satisfaction	0.350	0.182	0.168^{*}
Immersion → WOM	0.439	0.334	0.105^{ns}

Note(s): ns = not significant; $^{*}p < 0.1$; $^{**}p < 0.05$; $^{***}p < 0.001$
Source(s): Authors' own work

Table 4. Multi-group test results comparing high vs low value for AR-UV and AR-HV

	AR-UV (high vs low UV)			(AR-HV (high vs low HV)		
Paths	Standardized estimate (low value)	Standardized estimate (high value)	Difference	Standardized estimate (low value)	Standardized estimate (high value)	Difference
Person–VE interaction → Reality congruence	0.592	0.345	0.247^{**}	0.170	0.290	-0.119^{ns}
Person–VE interaction → Immersion	0.253	0.197	0.056^{ns}	0.380	0.410	-0.029^{ns}
Novelty → Reality congruence	0.092	0.200	-0.108^{ns}	0.330	0.248	0.082^{ns}
Novelty → Immersion	0.082	0.283	-0.202^{*}	0.113	0.153	-0.039^{ns}
Reality congruence → Immersion	0.432	0.272	0.160^{ns}	0.201	0.287	-0.086^{ns}
Reality congruence → Satisfaction	0.472	0.460	0.011^{ns}	0.488	0.298	0.190^{ns}
Reality congruence → WOM	0.319	0.085	0.234^{ns}	0.139	0.136	0.004^{ns}
Immersion → Satisfaction	0.279	0.072	0.208^{ns}	0.154	0.409	-0.255^{*}
Immersion → WOM	0.266	0.394	-0.128^{ns}	0.364	0.465	-0.101^{ns}

Note(s): ns $p > 0.10$; $^{*}p < 0.10$; $^{**}p < 0.05$; $^{***}p < 0.001$
Source(s): Authors' own work

($\beta_{low} = 0.592$, $\beta_{high} = 0.345$, $p < 0.05$). Therefore, person–VE interaction impacting reality congruence is especially essential in low UV AR experiences. Furthermore, the relationship between novelty and immersion ($\beta_{low} = 0.082$, $\beta_{high} = 0.283$, $p < 0.1$) is marginally significant and stronger for the high UV condition. As such, novelty needs to be heightened in high AR-UV experiences to facilitate an immersive experience.

In the AR-HV experience, only one relationship is significantly different. Immersion driving satisfaction ($\beta_{low} = 0.154$, $\beta_{high} = 0.409$, $p < 0.1$) is marginally significant and stronger in high HV conditions. High HV experiences can lead to higher satisfaction levels if utilizing immersive tools in AR contexts.

6. General discussion

This study provides important insights into the use of AR to create value-driven consumer experiences and outcome behaviors. The findings bridge a gap exploring the drivers of satisfaction and WOM for hedonic and utilitarian AR experiences. To date, most studies have considered value as one comprehensive construct. However, limited research has examined differences in hedonic and utilitarian AR experiences (Cranmer *et al.*, 2020; Hoyer *et al.*, 2020). All hypotheses are supported, and findings provide evidence for the proposed relationships across AR marketing experiences.

Interestingly, while established relationships such as novelty to immersion continue to be significant (e.g. Yim *et al.*, 2017), new constructs such as person–VE interaction and reality congruence immerge as stronger influences. Specifically, findings confirm the importance of person–VE interaction in eliciting reality congruence and consequently satisfaction. The relationship between these concepts has received limited attention; therefore, this finding has implications for AR marketing design. Whilst previous studies (c.f. Yoo *et al.*, 2015) examined the link between person–VE and reality congruence on sense of immersion and quality, our findings demonstrate the impact on AR user experience satisfaction. Therefore, the quality of AR content should be prioritized to be accurately realistic to generate an increased sense of presence within the experience, and thus increase users' satisfaction. Compared to technology adoption theories (i.e. TAM) this study focused on satisfaction as a behavioral outcome, in contrast to the traditional usage behavior, as it can be considered a priority for marketing (Fida and Naz, 2017).

In addition, the traditional concept of novelty as representing a new technology seems to have been replaced with the notion of new forms of customer engagement, a definition which we suggest for future research in this area.

A further contribution of this paper is the comparison of proposed relationships for hedonic and utilitarian AR experiences. While there have been extensive research studies examining AR experiences, there remain limited research studies incorporating both utilitarian and hedonic AR experiences (Picot-Coupey *et al.*, 2021). Akdim *et al.* (2022) recently recognized the need to explore the differences between utilitarian and hedonic experiences in the context of social media and confirmed limited differences between the two experiences. The PLS-MGA results reflect significant differences for person–VE interaction's influence on reality congruence and on immersion. While person–VE interaction is more important in eliciting reality congruence in utilitarian AR experiences, it is more essential in creating an immersive experience for hedonic AR applications. Subsequently, immersion is also more important in hedonic AR experiences when creating satisfactory experiences. These differences need to be considered when creating hedonic or utilitarian experiences in AR. Specifically, this supports Rauschnabel *et al.*'s (2019) claim that within AR marketing, it is essential to create realistic representations of real products to generate similar experience to shopping in-person.

Additionally, this research also investigated high versus low UV/HV conditions. Overwhelmingly, most of the relationships express importance for all levels of value considering the lack of significant differences. However, results confirm that reality congruence needs to be specifically focused on in low UV experiences. Given limited previous

research on reality congruence, this is an important finding and highlights the necessity to include realistic digital content and information within AR apps. This provides important insight for AR marketers and should be used to inform marketing strategy and AR marketing app design decisions.

For utilitarian experiences, novelty is important in eliciting immersion; however, only in high UV situations. As such, novelty is more essential in driving immersion when the AR experience is utilitarian. These findings provide more detailed insights into AR experiences concerning novelty and immersion beyond previous studies. Here, novelty includes not only the use of novel technology, but also the ability to interact with content in unusual and new ways (Jessen *et al.*, 2020; Uhm *et al.*, 2022). This has important implications for marketing strategy, since novelty is often only associated with the use of new technologies, rather than the provision of novel and engaging experiences. As such AR marketers should focus on updating the utilitarian experiences provided to ensure longevity and continued use. Immersion, specifically being able to interact with the experience as if it was in the real world, on the other hand, appears to be the dominant mediator for hedonic AR experiences. From a management point of view, this demonstrates that marketing applications designed to be used for pleasure are much more dependent on highly immersive content. This may lead to the concept of presence that has not been explored as part of this study but may create even stronger hedonic experiences (c.f. Daassi and Debbabi, 2021). Finally, according to Alimamy and Al-Imamy (2022), too many marketing studies have used IKEA Place or other well-established AR apps limiting the generalizability and understanding of AR experiences. In fact, Sung (2021) suggested that scholars should test lower cost or non-branded apps. Consequently, the current study focused on novel AR apps, differentiating between hedonic and utilitarian experiences, to increase generalizability of findings.

6.1 Theoretical contributions

Theoretically, this paper has numerous contributions. First, we applied a utilitarian-hedonic approach to AR experiences to add to the pool of knowledge on the different consumer motivations and behaviors when it comes to different types of experiences. Second, we test drivers of satisfaction and WOM confirming that the paths between person–VE experience and novelty toward satisfaction and WOM are mediated by immersion and reality congruence. Next, we examine differences across AR-HV and AR-UV experiences. Approaching the theoretical model with different experiences allows us to explore how different characteristics of AR experiences result in different propositions. Immersion is hereby a strong determinant of satisfaction and WOM within the hedonic context. Theoretically, this demonstrates that research needs to clearly choose or design appropriate conditions. Thus, more immersive experiences are more likely to create positive WOM.

One of the main empirical contributions is the inclusion of reality congruence within the proposed model as its effects on satisfaction and WOM have not been studied previously. Especially within the AR context, it is a determinant within both hedonic and utilitarian experiences yet more essential for utilitarian experiences. Moreover, the focus on novel AR apps in this research increases applicability and generalizability of the findings and extends the scope of extant literature (Alimamy and Al-Imamy, 2022; Sung, 2021).

6.2 Practical implications

AR is becoming more popular as an interactive medium for customers to receive information, co-create value, experience products and share experiences. Not surprisingly, it is now considered one of the leading disruptive technologies of today's consumer market (Rauschnabel, 2021) and a way forward for companies to sell on and provide metaverse experiences (Chen *et al.*, 2024).

Our findings highlight the differences in expectations of AR experiences. While consumers seem to use utilitarian applications to browse, choose products and services, possibly

personalize them and make an actual purchase decision, hedonic experiences appear to be used when individuals want to become fully immersed in an experience, and thus escape reality. For businesses and organizations this highlights the need for full awareness of their marketing strategy in terms of the intended purpose of an AR app, and the desired user and behavioral outcomes. Too often is AR adopted in a technology-driven, rather than user-driven approach, and thus the criticism that AR is merely a gimmick when the desired user outcomes are not achieved.

In practical terms this means that retailers and businesses that serve consumers with a desire for an efficient and quick experience, such as express supermarkets, would benefit with a focus on basic information such as pricing, origins, supply chain information, etc. On the other hand, entertainment services and retailers, such as toy stores, attract customers that would appear more inclined to engage with immersive experiences and thus, would serve well with the provision of hedonic AR experiences as part of their value adding activities. For instance, bringing content to life through AR gaming not only adds a new dimension to the experience but also creates brand loyalty. Compared to traditional marketing techniques, AR's benefits lie in the voluntary nature of its use by consumers and therefore, only those that want to engage with utilitarian and hedonic content will be required to do so.

Our study provides a clear distinction between offering hedonic or utilitarian experiences and demonstrates that customers show preferences for certain features according to the purpose of the application. Apps that aim to be used for information provision and sales are advised to focus on reality congruence, i.e. AR experience, design and functionality, whereas apps for hedonic experiences should emphasize the creation of immersive and engaging experiences to increase customer satisfaction and WOM.

6.3 Limitations and future research

The current research design presents an opportunity to examine relationships within and across conditions using PLS-SEM. However, several limitations emerge. This study offers insights into different types of AR experiences and mirrors the environmental differences outside of the technology world. However, only two different AR experiences were employed offering a multitude of new or examined AR experiences (e.g. Sephora visual artist, Ray Ban AR app) that could be used to replicate the current model. Considering that hedonic and UV experiences are grounded in retailing (Babin *et al.*, 1994; Picot-Coupey *et al.*, 2021), implementing an AR experience requiring participants to complete an actual purchase could further enhance the current findings.

Furthermore, additional environments beyond AR should be considered. Extrapolating the model to the metaverse (Rauschnabel *et al.*, 2022) would provide insights into value perceptions in this new type of environment. Regarding the current sample, all participants are from the USA. However, hedonic and utilitarian experiences have been extensively examined in different contexts, countries and cultures (Babin and Krey, 2020). What is currently lacking in AR marketing is a cross-cultural comparison to identify individual differences based on culture or country. These findings would assist in disentangling consumer personality traits associated with culture from factors linked to technology usage or technology familiarity. Furthermore, assessing value beyond the hedonic and utilitarian scope could be beneficial. For example, emotional and epistemic value could enhance the understanding of what drives value in AR experiences. Finally, there will be additional unexplored variables or mediators that can potentially have a significant impact on the AR experiences and outcomes. With the advancement of AR technologies (i.e. headsets that deliver ultrarealistic experiences), the significance of presence is set to grow. Consequently, future research should delve into presence theory, defining presence in the context of AR (i.e. spatial presence) and its impact on user experiences. It will be crucial to understand how different types and degrees of presence influence both utilitarian and hedonic experiences, as well as the resulting behaviors.

Future research is advised to extend the proposed models with up-to-date and context-specific variables to ensure applicability and currency. For example, reuse intention in the future or decision comfort could offer novel insights into AR marketing.

Notes

1. https://www.ikea.com/gb/en/customer-service/mobile-apps/
2. https://www.lego.com/en-gb/themes/technic/ar-app
3. https://www.sephora.sg/pages/virtual-artist
4. https://apps.apple.com/us/app/wanna-kicks-ar-shoes-try-on/id1444049305
5. https://arvid.app/

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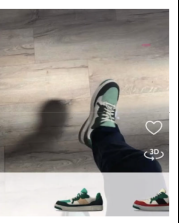
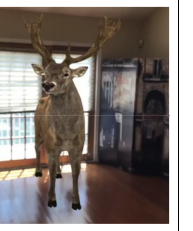
(The Appendix follows overleaf)

Appendix

Table A1. AR experiences

Experience	AR application	Description	Example
AR-UV	WannaKicks	The app allows users to try on shoes by pointing their smartphone camera toward their feet.	
AR-HV	ARVid	The app allows users to place animated objects into their own environment and share videos of the experience with others.	

Source(s): Authors' own work

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