emerald PUBLISHING International Journal of Retail & Distribution Management

The impact of experiential augmented reality applications on fashion purchase intention

Journal:	*International Journal of Retail & Distribution Management*
Manuscript ID	IJRDM-06-2017-0117.R3
Manuscript Type:	Research Paper
Keywords:	Augmented reality, Mobile applications, Experiential retail, Hedonic motivation, Purchase intention

The impact of experiential augmented reality applications on fashion purchase intention

Purpose

Utilizing the stimulus-organism-response (SOR) model, the purpose of this study is to examine the effects of augmented reality (AR) (specifically augmentation) on consumers' affective and behavioral response and to assess whether consumers' hedonic motivation for shopping moderates this relationship.

Design/methodology/approach

An experiment using the manipulation of AR and no AR was conducted with 162 participants aged between 18 and 35. Participants were recruited through snowball sampling and randomly assigned to the control or stimulus group. The hypothesized associations were analyzed using linear regression with bootstrapping.

Findings

The paper demonstrates the benefit of using an experiential AR retail application (app) to positively impact purchase intention. The results show this effect is mediated by positive affective response. Furthermore, hedonic shopping motivation moderates the relationship between augmentation and the positive affective response.

Research limitations/implications

Because of the chosen research approach, the results may lack generalizability to other forms of augmentation. Therefore, researchers are encouraged to test the proposed model using different types of AR stimuli. Furthermore, replication of the study with other populations would increase the generalizability of the findings.

Practical implications

Results of this study provide a valuable reference for retailers of the benefits of using AR when attempting to optimize experiential value in online environments.

Originality/value

The study contributes to experiential retail and consumer purchase behavior research by deepening the conceptualization of the impact of experiential technologies, more specifically AR apps, by considering the role of hedonic shopping motivations.

Keywords: Augmented reality, Mobile applications, Experiential retail, Hedonic motivation, Purchase intention.

Article type: Research paper

1. **Introduction**

Retail has experienced seismic shifts over recent years due to the growth of digitalization and online channels (Verhoef *et al*., 2015). Grewal *et al.* (2017) argued that retailing is evolving at an accelerated rate due to changes made possible by new technologies. One such technology, with "the potential to transform the shopping experience" (Duncan *et al*., 2013, p. 6) is augmented reality (AR). AR can enhance sensory perceptions for consumers by superimposing virtual elements directly into the real-time environment (Yaoyuneyong *et al*., 2016). With the increasing ubiquity of smartphones and tablets, AR applications (apps) are increasingly being embraced by retailers as a tool for creating immersive customer experiences. For example, Burberry, Topshop, Sephora, and Panasonic are all examples of retailers which have recently launched AR mobile apps. However, whilst it has been argued that AR will play an important role in the future of retail (Grewal *et al*., 2017; Javornik, 2016a), our understanding of how it impacts consumer behavior is still relatively under researched.

This paper, therefore, seeks to contribute to our understanding of how AR apps influence consumer behavior. Given that accessible AR technology is a relatively recent phenomenon, the literature is nascent, although growing rapidly. Much of the literature on AR has focused on adoption-based factors, using traditional technology acceptance models (Huang and Liao, 2015; Lee *et al*., 2006; Pantano and Servidio, 2012; Rese *et al.*, 2014, 2016), or the impact of specific AR features on emotional and behavioral responses (e.g. Huang and Liu, 2014; Huang and Liao, 2017). However, the impact of consumer traits has received less attention in the AR literature (Javornik, 2016b). As Fiore and Kim (2007) highlighted, person variables (consumer characteristics) may influence the strength and direction of the relationship between environmental stimuli (in this case AR) and its consequences. Indeed, a number of

studies of traditional and online formats, have found that characteristics such as the shopper style moderate the relationship between retail atmospherics and consumer responses (Chang *et al*, 2011; Eroglu *et al*., 2001; Lee *et al*., 2006; Morrin and Chebat, 2005). However, within the context of AR, there are very few studies that have considered consumer traits. This paper seeks to address this gap by exploring a key consumer trait: hedonic shopping orientation. We consider whether the extent to which a consumer is hedonically motivated influences their response to AR stimuli. Consumers who are hedonically oriented in their motivation to shop are more concerned with the entertainment, fun, and sensory stimulation aspects of shopping (Babin *et al*., 1994). This contrasts with consumers who are more utilitarian in their motivations, who are more mission- or task-oriented (Arnold and Reynolds, 2003). We focus on hedonic shopping motivations given that the experience of AR is likely to be more hedonic than utilitarian (Javornik, 2016b) and, therefore, may particularly appeal to consumers with hedonic shopping values.

To explore the effect of AR on consumers, we focus on the defining characteristic of AR (compared with other interactive technologies, such as virtual reality), i.e. augmentation. We consider the effect of augmentation through an application of the traditional stimulus-organism-response (SOR) model. This model enables researchers to empirically identify causal links between physical experiential retail elements, consumers' affective responses, and purchase intentions and behaviors (e.g. Baker *et al*., 1992; Chang *et al*., 2011; Donovan and Rossiter, 1994). The model is well established and provides a useful mechanism for considering how new and emerging experiential retail technologies influence consumers' affective and behavioral responses, and has been applied by a number of researchers in the context of online shopping behaviors (Eroglu *et al*., 2001; Hu *et al.,* 2016; Huang, 2012; Menon and Kahn, 2000). The objectives of this study are thus primarily twofold: to

understand the effect of augmentation (as the stimulus) on consumers' affective and behavioral responses; and to determine whether consumers who are hedonically motivated respond differently to the augmentation experience, i.e. to examine the potential moderating effect of hedonic shopping motivation. In so doing, we respond to the call by Javornik (2016b) for AR studies to consider consumer characteristics.

The first section of the study presents an overview of the literature on experiential retailing and experiential AR and its effects on consumers' affective states and purchase behavior from which hypotheses are deduced. The methodology used in this research is then described, followed by a presentation of the key results and discussion. Finally, the study's limitations and contributions are elucidated, and we present a model to help guide future research and theory development.

2. Theoretical background

2.1 AR in experiential retailing

Innovation in interactive technologies is dramatically modifying the retail landscape, enabling retailers to provide new, entertaining, memorable, and emotional experiences for consumers (Bäckström and Johansson, 2006; Holbrook and Hirschman, 1982; Papagiannidis *et al.*, 2017; Srinivasan and Srivastava, 2010). The experiential aspects of consumption were originally conceived by Holbrook and Hirschman (1982), as "hedonic consumption" (distinct from utilitarian consumption): such experiential consumption can derive from aesthetic enjoyment, playful activities, and multisensory and emotional inputs within the retail context. Thus, experiential retailing involves the whole shopping experience, rather than just the product, and addresses the enjoyment of shopping (Holbrook and Hirschman, 1982). Research has shown some product classes are deemed more hedonic, as their benefits

naturally lie in their aesthetics and symbolic or sensory character (Lim and Ang, 2008). Two such product classes that have a high experiential appeal are fashion and cosmetics (Clarke *et al*., 2012; Hirschman and Holbrook, 1982; Wang *et al*., 2000). When shopping for these product categories, consumers tend to be more hedonically motivated (Clarke *et al*., 2012). Thus, experiential aspects of shopping may be particularly important for consumers when purchasing beauty or fashion products (Park *et al*., 2006), such as in the context of this study, which explores the effect of an AR cosmetics app.

For a long time, retail atmospherics have been the focus of research when examining retail features that can create experiences and influence consumers' emotions and purchase behavior (Alexander and Nobbs, 2016; Clarke *et al*., 2012; Hultén, 2011; Kotler, 1973). Kotler (1973) was one of the first to evidence the importance of creating sensory touch points within the retail environment to generate consumer experiences, shifting attention from the product to the holistic retail experience, and highlighting the causal effects of experiential retail elements on consumers' emotional response and purchase behavior. Indeed, some studies have shown the benefits of consuming experiences rather than physical possessions (Pine and Gilmore, 2011) and, increasingly, trade sources assert experiential retailing as a key differentiator for businesses (Abnett, 2016; Mintel Trends, 2016). Driven by the rising share of digital consumers with demanding expectations in terms of technology, retailers are embracing novel technologies to generate immersive consumer experiences (Abnett, 2016; Papagiannidis, *et al*., 2017). AR is one such form that is being increasingly used, yet extant empirical studies on consumer behavior are scarce (Javornik, 2016b; Rese *et al.*, 2016). This study seeks to contribute to this growing stream of literature by exploring the effect of augmentation, as the key distinguishing feature of AR, on consumers' emotional and behavioral responses.

2.2 AR

Interest in, and usage of, augmented reality interactive technology (ARIT) is rapidly increasing. Extensive smartphone adoption, cost decreases, rising mobility and AR's ability to provide experiential value and influence consumer purchasing decision, have all contributed to this rise. Thus, AR has shifted from the laboratory to the commercial retail realm (Rese *et al.*, 2016), empowering consumers to evaluate products and make decisions with more certainty (Kim and Forsythe, 2008). Whilst AR is not a new industry phenomenon, there remains a paucity of systematic studies concerning the impact of AR on consumers or users, and especially AR apps (Javornik, 2016b; Poushneh and Vasquez-Parraga, 2017; Rese *et al*, 2016). Previous AR research has been within the domain of human−computer interaction (e.g. Azuma *et al*., 2001; Carmigniani and Furht, 2011), potential usage (Kim and Forsythe, 2008; Rese *et al.*, 2016) and has only more recently extended into the realm of consumer behavior (Javornik, 2016a). Javornik (2016b) and Rese *et al.* (2016) provided a useful assimilation of extant AR research within a retailing context, which we consider here under three key themes: definition and evolution; adoption; and features.

2.2.1 AR definition and evolution

AR is a technology that layers virtual elements over physical environments, and thus blends virtual worlds with reality. The superimposed virtual elements can involve videos, images, or other virtual items and are situated between the real-life environment and the user (Javornik, 2016b). Hence, AR enables consumers to interact with virtual elements in the context of their real-life surrounding: consumers can access AR on their own mobile devices, such as smart phones, tablets and laptops (Augment, 2015; Rese *et al*., 2016). AR has mostly been studied in the context of computer technology (Javornik, 2016b; Rese *et al*., 2016) and the most

accepted definition of AR, introduced by Azuma *et al.* (2001, p. 34), stems from the same area of research:

> "An AR system supplements the real world with virtual (computer-generated) objects that appear to coexist in the same space as the real world. (...) we define an AR system to have the following properties:
>
> - combines real and virtual objects in a real environment
> - runs interactively, and in real time and
> - registers (aligns) real and virtual objects with each other."

Azuma *et al.*'s (2001) definition underlines the combination of virtual and real elements and their real-time mutual alignment. In other words, AR enables an augmentation of reality with virtual elements (Javornik, 2016b). Milgram *et al.* (1994) put this unique augmentation ability of AR into context by means of their reality−virtuality continuum, in which AR is defined as part of a mixed-reality dimension.

While in a virtual environment (virtual reality), real elements are layered over virtual worlds, AR is capable of adding virtual elements to real elements. These real elements include persons, products, or surroundings (Javornik, 2016b). In retail, this means that AR can enrich either retail products, consumers, or retail environments with virtual elements in real time, with the potential to create immersive consumer experiences (Bulearca and Tamarjan, 2010; Huang and Liao, 2015). Consequently, with AR technology becoming more affordable, many retailers have implemented AR in their experiential retail repertoires (Deloitte, 2016; Mintel Trends, 2016).

Whilst AR is not in itself new − Javornik (2016b) suggested that the first forms of AR date back to the 1950s in cinematography − it was not until the 1990s that AR gained increased attention within computer science and its adoption became more widespread. The first commercial use of AR was in 2008 by the automobile industry in the form of a 3-D simulation. Since then, many forms of AR apps have emerged, including virtual annotations (Google Glass), virtual try-ons, content augmentation, holograms, and projection mapping (Javornik, 2016a). The shift to digitalization has enabled AR usage to extend beyond niche industries to impacting the consumer journey, especially within retail's online and mobile environments (Javornik, 2016b; Poushneh and Vasquez-Parraga, 2017; Scholz and Smith, 2015). Indeed, the increasing ubiquity of smartphones has led to a surge in interest in mobile AR apps (Dacko, 2017).

A recent example of the use of AR on mobile devices is makeup brand Rimmel's makeup mirror mobile app. Rimmel's "Get The Look" app enables consumers to try out the makeup styles of everyone "from friends in real life through to celebrities in magazine images" (Forbes, 2016). The app overlays the user's face via the front-facing camera with the previously scanned makeup look. This means that, after scanning the face of a real-life friend or a model in a print campaign, the user sees the scanned makeup look applied on their own face and can purchase corresponding Rimmel products via the app (Forbes, 2016). Even when moving their head, the makeup realistically stays on the consumer's mirrored face (Javornik *et al*., 2016). This AR makeup mirror app features similar experiential qualities to in-store AR mirrors: the user interacts by scanning a person's face, before the app enriches the user's own face image by overlaying their face with the makeup look. The resulting visual image provides users with a real-time illusionary reflection of themselves. Thus, the AR try-on mirror apps can be defined as experiential because of their sensory and

multifaceted experiential qualities. This study, therefore, utilizes a leading cosmetics brand AR app, which uses such a virtual mirror to empirically investigate the effects of an experiential AR retail technology. Table I provides other recent examples of AR technologies introduced by retailers across a range of different sectors.

<<Insert Table I about here>>

Dacko (2017) suggested a number of potential benefits of AR apps for retailers. He suggested that, by enabling consumers to virtually try on clothing and make up (such as in the case of the Rimmel app), AR can improve conversion and return rates. He further argued that, by providing a more interactive and interesting experience, AR can enliven otherwise static shelf displays (e.g. the Walgreen app) and help drive store footfall. Finally, he suggested that AR apps enable a more personalized shopping experience (e.g. the Converse or Topology Eyewear apps). However, whilst AR suggests a number of potential benefits to retailers, the focus of the AR literature has tended to be on consumer adoption, and it is only relatively recently that explorations of how AR impacts consumers' emotional and behavioral response has begun to be explored.

2.2.2 Consumer adoption of AR

Given that early research on AR was most prominent in human−computer interaction literature (Javornik, 2016a), it is perhaps unsurprising that much of the literature has considered adoption factors (for a review, see Rese *et al.*, 2016), drawing on the technology acceptance model (TAM) and its variants. Within these studies both hedonic and utilitarian features have been explored, in keeping with TAM. Perceived usefulness and perceived ease of use seek to capture the more utilitarian features of AR, whilst perceived enjoyment is used

to capture the hedonic values. As Huang and Liao (2015) noted, whilst perceived usefulness and perceived ease of use have been considered the most critical factors to encourage consumer adoption of AR technologies, the inclusion of experiential value constructs such as perceived enjoyment would seem to improve the explanatory power of TAM. Indeed, several studies have found that enjoyment and experiential value influence consumer behavior in virtual environments (Huang and Liu, 2014; Kim and Forsythe, 2008; Lee *et al*., 2006). According to Huang and Liu (2014, p. 83) the highly interactive experience of AR transcends traditional means of retailer interactions (e.g. product picture reviews, etc.) and, borrowing from Fogg (2003), they asserted that AR should be viewed as a "persuasive technology, capable of forming and delivering experiential value rather than performing only as a functional technology". It would seem that it is the hedonic value of AR that potentially distinguishes it from other interactive technologies (Javornik, 2016b). Thus, to better understand the effect of AR technologies on consumer behavior, researchers have begun to explore its features and their role in creating utilitarian and hedonic value and how this impacts purchase intention (rather than adoption *per se*). Our study seeks to contribute to this nascent literature by exploring the affective and behavioral responses arising from AR experiences and, in particular, by considering the effect of hedonic motivations on these responses.

2.2.3 AR features

To explore the potential impact of AR technologies on consumer response, recent researchers have considered its core characteristics (interactivity, hypertexuality, modality, connectivity, location-specificity, mobility, virtuality) with a particular focus on interactivity (Javornik, 2016a; Poushneh and Vasquez-Parraga, 2017), modality (Huang and Liu, 2014; Jin, 2009), and augmentation. Interactivity has been extensively investigated and refers to the "extent to

which users can participate in modifying the form and content of a mediated environment in real time" (Steuer, 1992, p. 84). It has been suggested that interactivity entertains and immerses users, thus creating a positive affective response (Fiore *et al.*, 2005). Several authors have explored how interactivity creates experiential value through its ability to create flow, i.e. the immersion of consumers into a highly absorbing state when using interactive features (Javornik, 2016b; van Noort *et al*., 2012). Modality refers to the types of content provided by the medium (Javornik, 2016b), such as audio or visual formats. It is through this stimulation of the senses that consumers respond, with a suggestion that stimulations to multiple senses will be more effective than those appealing to just one (Li *et al*., 2002).

The ability to create flow − complete immersion into the virtual consumption experience − has also been explored from a number of other perspectives. For example, Huang and Liao (2017) considered the role of two sensory features of AR in creating a multisensory flow experience: haptic imagery (the creation of a sense of touch); and self-location (i.e. the consumer's self is located within the virtual image). They found that these AR features, through "the vivid and realistic embodiment of spatial vision" (Huang and Liao, 2017, p. 465) create a first-person perspective and sense of self-location, and thus an authentic experience. Huang and Liu (2014) explored whether the persuasive effects of narrative (cause and effect simulations), media richness (environment simulations), and presence (object simulations) differ. Their findings suggested that AR designed to create narrative is critical in creating experiential value.

Javornik (2016a) argued that the ability of AR to create immersive experiences is through its defining characteristic of augmentation. Javornik (2016a) argued that augmentation is unique to AR in its ability to enhance physical reality, i.e. its ability to overlay physical

environments with virtual elements. As Javornik (2016a) noted, AR is more than just another interactive technology as its ability to augment or modify the visual representation of reality in real time creates a more immersive flow compared to other equally interactive experiences. Indeed, studies by Javornik (2016a) and Poushneh and Vasquez-Parraga (2017) both serve to demonstrate the importance of augmentation in promoting immersion, playfulness, and excitement, resulting in enhanced experiential value creation. We therefore focus on this key feature of augmentation in considering how AR retail apps influence consumer behavior.

2.3 Theoretical framework

To explore the impact of AR on purchase intention, the study draws on an adaptation of Mehrabian and Russel's (1974) SOR model. The classical model proposes that, when an individual encounters a stimulus (S), he/she develops internal states (O), which in turn dictates his/her responses (R). Thus, in keeping with Kotler (1973), the model suggests that sensory stimulation impacts the consumer's affective state, which then influences purchase intentions. Since its application to the retail environment by Donovan and Rossiter (1982), several researchers have used the framework to empirically identify causal links between experiential retail elements, consumers' affective responses, and approach purchase behaviors (e.g. Baker *et al*., 1992; Chang *et al*., 2011; Donovan and Rossiter, 1994; Huang 2012; Huang and Liu, 2014; Menon and Kahn 2000; Wu *et al*., 2013). More recently, corresponding to literature concerning offline experiential retail (Donovan and Rossiter, 1994; Kotler, 1973), a number of studies have applied the SOR model to explore both the direct and indirect effects of experiential online retail elements on consumer behavior (Eroglu *et al*., 2001; Huang, 2012; Menon and Kahn, 2000), with online retail cues providing the stimulus (S). This study aims to investigate whether the use of an AR retail app leads to similar effects on consumers' affective state and behaviors that other experiential retail

elements have shown and explores whether consumers' shopping motivation orientation creates differential outcomes.

2.3.1 Augmentation and positive affective response

The extant literature suggests that experiential retail elements evoke positive affective responses (Donovan and Rossiter, 1982, 1994; Hoffman and Novak, 2009; Kim and Forsythe, 2007, 2008; Kotler, 1973). This study investigates whether an AR app similarly evokes a positive affective state, and thus the AR app provides the "stimulus" (S). As highlighted earlier, interactivity is a characteristic of AR and the literature suggests that interactivity is linked with positive affective responses (O) (Fiore *et al*., 2005; Huang, 2012). Of course, interactivity is not unique to AR, but Javornik (2016a) proposed that AR technologies provide a unique form of interactivity through augmentation, which refers to its "ability to overlay physical environments with virtual elements" (Javornik, 2016b, p. 259). It is the quality of augmentation which has been found to be the most relevant characteristic of AR retail technologies in understanding its influence on consumers (Javornik, 2016a). Indeed, parallel to effects of other experiential retail features, augmentation has been shown to influence consumers` affective states and behavioral intentions (Javornik, 2014, 2016a), and it is for this reason which we focus on this feature of AR. Therefore, the following hypothesis is proposed:

- *H1*: The presence of AR in an app leads to stronger positive affective responses compared with non-augmented apps.

2.3.2 Purchase intention

The predictive power of positive affective states has been explored in many studies concerning the working mechanism of experiential retailing elements (Baker *et al*., 1992;

Chang *et al*., 2011; Donovan and Rossiter, 1994; Eroglu *et al*., 2001; Huang, 2012; Menon and Kahn, 2000). The literature indicates that approach behaviors (purchase intentions and behaviors) can be increased by positive affective states such as arousal, pleasure, positive emotion, and positive mood. Purchase intention (R) is an effective measure to anticipate consumers' response behavior (Li *et al*., 2001; Li *et al*., 2002). It measures a combination of consumers' interest in, and possibility of, buying a product (Kim and Ko, 2012) and is strongly related to the individual`s future purchase action (Hung *et al*., 2011; Kim and Ko, 2012). It is for this reason that it has been adopted by many studies (Baker *et al*. 1992; Huang, 2012) to estimate consumers' future purchase behavior. Consumers who experience a greater (positive) emotional response will have stronger purchase intentions. The following relationship is therefore proposed:

- *H2*: The effect of augmentation on purchase intention is mediated by positive affective responses.

2.3.3 Hedonic motivation

Several authors have highlighted the ability of AR to add enjoyment and playfulness to the simulative shopping experience (Huang and Liu, 2014; Huang and Liao, 2017; Javornik, 2016a). Javornik (2016b) contended that AR seems to provide a more hedonic rather than utilitarian experience. In this regard, it seems probable that consumers' shopping motivations may create differential emotional responses and outcomes. Consumers with hedonic shopping motivations are primarily concerned with hedonic fulfilment, such as experiencing fun, amusement, fantasy, and sensory stimulation (Babin *et al*., 1994). Their focus is on the enjoyment of the experience itself (Childers *et al*., 2001) and, therefore, we would expect consumers who have high hedonic motivations to derive greater pleasure from augmentation, compared to those with lower hedonic motivations.

Although a number of studies have considered how hedonic versus utilitarian motivations influence shopping behaviors (e.g. Arnold and Reynolds, 2012; Childers *et al*., 2001; To *et al*., 2007), studies exploring the moderating effect of hedonic motivations on experiential retailing are limited (Fiore and Kim, 2007; Chang *et al*., 2011). The literature does suggest, however, that consumers with higher hedonic motivation are more likely to engage in interactive aspects of shopping (Arnold and Reynolds 2003; Chang *et al*., 2011; Hirschman and Holbrook, 1982). Interactivity is a key feature of AR apps (Javornik, 2016b), suggesting that consumers with greater hedonic shopping motivations may engage more fully with such technologies to enhance their experience. As Arnold and Reynolds (2012) argued, consumers with stronger hedonic motivations who seek hedonic experiences appear to find them and experience them more strongly. It seems probable, therefore, that hedonically motivated shoppers will derive greater pleasure from the AR experience.

Thus, whilst *H1* proposes that the presence of AR in an app leads to stronger positive affective responses compared with non-augmented apps, we also propose that the increase in positive affective response will be influenced by the extent to which a consumer exhibits hedonic shopping motivations. We argue that consumers who have high hedonic motivations will experience a greater increase in their positive emotional response when experiencing augmentation than those who have low hedonic motivations, i.e. shopping motivation will moderate the relationship between augmentation and positive affective response. Thus:

- *H3*: The effect of an augmented experience on positive affective response is greater for consumers with higher hedonic shopping motivations, compared with those with lower hedonic motivations.

The resulting theoretical framework incorporates the advanced SOR model by Fiore and Kim (2007) and the hedonic motivation moderator (Chang *et al*., 2011) to empirically investigate the effects of an experiential AR app on consumers' positive affective responses and purchase intentions and moreover to determine the moderating role of individual hedonic motivation on this relationship.

3. Methodology

To test the hypotheses, an online experiment was conducted with 162 participants, where the experiential AR makeup retail app of a leading cosmetics brand served as the stimulus. Two conditions existed within the experiment, using an approach in keeping with Javornik (2016a). In the condition "augmentation," participants interacted with the AR makeup app (having downloaded it), while in the condition "non-augmentation," they interacted with the mobile makeup shopping site from the same brand. Thus, the effect of the stimulus "augmentation," could be measured in relation to purchase behavior.

Convenience sampling was used for the study. Participants were recruited at a Swiss University, through university social media, as well as through makeup forums and the commentary section of YouTube makeup tutorial videos. Snowball sampling was employed to gain a larger sample. All participants of the experiment were female and aged between 18 and 35 years. Of the total sample, the majority were aged under 25, with 37.7% of the sample aged 18−21, and 42.6% aged 22−25. The remainder (19.7%) were aged between 26 and 35. University students, and those recruited through online makeup forums were considered appropriate for studying the effects of AR because they are computer-literate and comfortable with new technology (Lee *et al*., 2006) and, therefore, more likely to try, or use, these features. Respondents were randomly assigned to either the control or stimulus group, with

the final sample comprising 70 respondents who had used the AR app, and 92 in the control group.

Whilst the total sample size is relatively small, we believe 162 respondents are sufficient for the analysis. Whilst views do differ as to minimum numbers, Stevens (1996), for example, suggested that approximately 15 subjects per predictor are needed. In our regressions there are a maximum of three predictors, and therefore our sample size meets the criteria. Tabachnick and Fidell (2001) suggested a minimum n=50, with an additional 8 subjects per independent variable. This would suggest a minimum sample size of 74, which we exceed. Furthermore, our sample size is in line with, or exceeds, similar studies (e.g. Javornik, 2016a (n=60); Moon *et al.*, 2008 (n=116).

The experimental groups used an AR makeup app with a virtual reality mirror, which allowed users to "try on" different makeup styles. The virtual mirror responded to the users' movements, enabling the makeup to be viewed from different angles. Thus, in keeping with Javornik's (2016a, p. 990) definition of AR, the technology combined real and virtual objects in a real environment, ran interactively, and in real time, and aligned real and virtual objects together. The non-AR website also allowed users to "try on" makeup products, but either through "applying" the makeup onto a choice of four different models, or onto an uploaded image. Although the user could zoom in on different parts of the image, the image was static. Thus, the website had similar content to the AR app, but without AR features. In this sense, we could control for augmentation.

The experimental session comprised four parts. First, the participants completed demographic questions, followed by questions pertaining to hedonic motivation. Next, the participants

were asked to interact (for approximately five minutes) with either the experiential AR app or the mobile makeup shopping site, depending on the experimental condition. After the interaction, the participants completed the remaining questions. This part included questions concerning the positive affective response, perceived augmentation, and purchase intention. The experiment took approximately 15 minutes to complete.

3.1 Measurement of constructs

Augmentation was assessed using a dummy scale (manipulation compared with control group). As a further check that augmentation had indeed occurred, respondents who experienced the AR app were asked questions pertaining to "perceived augmentation," using the five-item, seven-point Likert scale developed by Javornik *et al*. (2016). The scale exhibited high reliability with a Cronbach's alpha value of 0.99. The mean score was 6.22, confirming that the app did provide an augmented experience. This compares with a mean score of augmentation of 1.42, confirming that those who used the virtual reality app (as opposed to the AR app), did not experience augmentation.

Positive affective responses were operationalized with Chang *et al*.'s (2011) seven-item positive emotion scale. Participants were asked to indicate to what extent they were "excited," "enthusiastic," "joyful," "entertained," "happy," "interested," and "inspired" using a seven-point Likert scale (1=entirely disagree to 7=completely agree). The scale exhibited high reliability with a Cronbach's alpha value of 0.93.

Behavioral response was measured using the variable "purchase intention" by adapting the four-item scale used in previous research (Dodds *et al*., 1991; Moon *et al*., 2008; Sweeney *et*

al., 1999). All four items were measured on a seven-point Likert scale, where respondents were asked to indicate the extent to which they agreed with each of the following statements:

1. I will purchase the cosmetics I interacted with.
2. Given a choice, my friends will choose the cosmetics I interacted with
3. There is a strong likelihood that I will buy the cosmetics I interacted with
4. I will recommend the cosmetics I interacted with to my friends.

The scale exhibited high reliability with a Cronbach's alpha value of 0.91.

The moderating variable, "hedonic motivation for shopping," was measured using Chang *et al*.'s (2011) four-item scale. Respondents were asked to indicate the extent to which they agreed with each of the following statements on a scale of 1 (entirely disagree) to 7 (completely agree):

1. Shopping is a way I like to spend my leisure time.
2. Shopping is one of my favorite activities.
3. Shopping in general is fun.
4. I am a person who is looking for more fun and enjoyment of shopping.

Again, the scale exhibited high reliability with a Cronbach's alpha value of 0.94.

As a further check of construct validity, principal component analysis was undertaken to examine the factor structure of the variable measurement scales. The analysis showed a significant Bartlett's test of sphericity (p=0.00) and a satisfactory value for KMO (KMO=0.92). All scales had acceptable factor structures, with all items having factor loadings above 0.70 and all factors with eigenvalues greater than 1.

Convergent validity was evaluated using the average variance extracted (AVE). All constructs had AVE values exceeding 0.50, confirming that the measures exhibited satisfactory convergent validity (Barclay *et al*., 1995). In addition, the composite reliability

scores were above the threshold of 0.60 (Bagozzi and Yi, 1988). Discriminant validity of the measures was explored by examining the correlations between the constructs. Square roots of the AVE (reported on the diagonal in Table II) were all greater than the construct correlations, suggesting the constructs were more strongly related with their own measures than with any of the other constructs.

<<Insert Table II about here>>

4, Results

Table II presents the means, standard deviations, and correlations of the constructs.

H1 proposed a positive relationship between augmentation and positive affective response. In order to test this hypothesis a t-test was executed. Those respondents who had experienced the augmentation had an average positive affect score of 4.87, compared with those who had not of 3.78 (p=0.00), supporting *H1*. The relationship between perceived augmentation and purchase intention and the mediating effect of positive affective response was analyzed using linear regression, with the mediation effects assessed with bootstrapping analysis, using model 4 of the PROCESS macro (Hayes, 2013). As can be seen in Table III, positive affective response mediated the relationship between augmentation and purchase intention, supporting *H2* (F-change statistic=35.01, p=0.00). The total indirect effect was 0.616 (SE 0.1381, z=4.4606). The upper and lower confidence intervals of the indirect path with bootstrapping did not cross zero, suggesting a significant mediation effect, and this was confirmed by the Sobel test (p=0.000).

<<Insert Table III about here>>

To test the moderating effect of hedonic motivation on the relationship between augmentation and positive affective response, the variables were centered before exploring

the interaction affects. A linear regression model with bootstrapping analysis was run using model 7 of the PROCESS macro (Hayes, 2013), with positive affective response as the dependent variable. As can be seen from Table IV, the results confirmed the findings from the t-test analysis, showing a significant and positive relationship between augmentation and positive affective response. Support was found for *H3*, as the interaction variable (hedonic motivation × augmentation) was significant (p=0.015). The R-square increase due to the interaction was also significant (F-change statistic=6.099, p=0.015). The significance of the interaction effect was present at high (1 standard deviation above the mean), low (1 standard deviation below the mean), and moderate (at the mean) levels of hedonic motivation, with the greatest effect at higher levels of hedonic motivation (see Figure 1). Figure 2 summarizes the results for the proposed model.

<<Insert Table IV about here>>

<<Insert Figures 1 and 2 about here>>

5. Discussion

This study drew on the SOR model (Mehrabian and Russell, 1974) to understand the potential effect of augmentation on purchase intention, where augmentation formed part of the stimulus. The SOR model is well established in the broader experiential retailing literature, but its application to AR is limited. Whilst Javornik (2016a) did consider both affective and behavioral responses to AR technologies, she did not consider the relationship between affective and behavioral responses (rather they are treated as different dimensions of brand related responses). The findings here suggest that augmentation creates a more positive emotional response than interactions without augmentation. This finding is in keeping with Javornik (2016a), who also found that augmentation creates stronger positive emotional

responses than other forms of interactivity. However, our results further show that it is this enhanced emotional response that creates greater purchase intention for those experiencing augmentation, i.e. the effect of augmentation on behavior (in this case purchase intention) is mediated by the positive affective response it evokes. To understand why this enhanced emotional response is achieved, it is useful to consider some of the key features of augmentation. Augmentation provides modality richness, the "intensity with which a mediated environment is able to present information to the senses" (Li *et al*., 2002, p. 45), presumably by creating greater sensory depth. Thus, as suggested by Javornik (2016a), AR does not necessarily create greater interactivity than apps without AR; rather, it creates a rich sensory experience, resulting in stronger emotional (and therefore behavioral) responses.

Our results also reveal that the response to augmentation may differ according to the shopping orientation of the consumer. Consumers who are more hedonically motivated experience a greater positive emotional response than those with low levels of hedonic motivation. As can be seen from Figure 2, whilst the positive affective response is higher under the augmentation condition at all levels of hedonic motivation, the steeper line under the augmentation condition shows that, at higher levels of hedonic motivation, the positive emotional response is stronger. This result can be explained if it is considered that consumers who are motivated by hedonic needs place more value on the shopping experience itself, rather than simple task completion (Hirschman and Holbrook, 1982) and, as such, are more likely to engage in interactive aspects of shopping (Arnold and Reynolds, 2003). Furthermore, as Javornik (2016b) argued, AR would seem to provide a more hedonic rather than utilitarian experience. Thus, consumers who are more concerned with hedonic fulfillment derive greater pleasure from the augmented experience. However, this is one of few studies to the authors' knowledge to consider how different consumer characteristics

might lead to differential outcomes, and the first to the authors' knowledge to consider the role of hedonic motivations. Our findings provide some insights into the differential effect of shopping motivation and suggest that further exploration of other consumer characteristics could be a fruitful avenue for future research to improve our understanding of the potential value of retail AR apps.

5.1 Implications and limitations

The findings suggest that the implementation of experiential AR elements in online retail may help increase consumers' positive affective responses and influence their desire to purchase. AR apps appear to improve the sensory richness of the experience and thus should be considered as a potentially valuable tool in creating effective interactions with consumers. The study sought to contribute to our understanding of the potential impact of AR by introducing the consumer trait of hedonic motivation. Whilst the experiential values of consumers have been considered in other contexts (e.g. online retailing; Fiore and Kim, 2007), this is the first study to consider this with respect to AR. The moderating role of hedonic motivation found here would suggest that retailers of product categories where consumers tend to be more hedonically motivated, such as fashion and cosmetics (Clarke *et al*., 2012), may obtain greater benefit from AR apps than retailers whose shoppers may have more utilitarian motives (e.g. grocery). However, it is worth noting that, whilst the emotional response caused by augmentation was magnified for consumers who were hedonically motivated, even those with low hedonic motivation experienced an enhanced positive affective response.

It should be noted that this study used convenience sampling, principally drawn from a student population. Although the sample may be considered an appropriate audience of target

customers, the sample composition does limit the external validity of the study. Replication of the study with a larger, more representative sample of the wider population would improve the generalizability of the findings and enable further exploration of the potential differential effect of other consumer characteristics. Furthermore, just one form of AR app was used in the experiment, essentially exploring a single technique of augmentation (virtual mirror). Future studies could explore how different augmentation techniques compare in the affective and behavioral responses they provoke. In this regard, it may be that augmentation techniques that create both modality richness both in terms of depth and breadth (i.e. the number of senses that are stimulated) may evoke stronger affective (and thus behavioral) responses. We further consider such potential directions for future studies in the next section.

5.2 Future research directions

Our study has highlighted that the effect of AR apps may differ depending on the consumer shopping orientation. In this context, we explored just one orientation, that of hedonic shopping motivation. We focused on this, given that it has been suggested that AR provides a more hedonically oriented experience (Javornik, 2016b). Furthermore, we have focused on the key distinguishing feature of AR, that of augmentation. However, as was noted in our review of the AR literature, AR technologies can provide a number of additional features, such as interactivity and modality. Thus, future studies could build upon our initial framework, to consider how different AR features can be used to create differential experiential values to appeal and add value in differing retail contexts. In this case, we focused on a beauty app, where hedonic experiences are likely to be particularly valued. It is possible that in other contexts, such as grocery, AR experiences which provide more utilitarian (that is task-oriented) experiences may be valued more by consumers.

Whilst there have been a number of attempts to classify experiential sources of value, Holbrook's (1996) typology, and variants thereof, is probably the most widely adopted. Holbrook proposed that experiences can be classified by the extent to which they offer extrinsic or intrinsic value where, broadly speaking, intrinsic value pertains to hedonic value and extrinsic value relates to utilitarian value (Dacko, 2017). Holbrook also proposed that experiences can be categorized as being more active or reactive, such that value "is active when it entails some physical or mental manipulation of some tangible or intangible object" (Holbrook, 1996, p. 139). Conversely, reactive value derives from an appreciation for, or response to, a consumption object (Holbrook, 1996). Using these two dimensions, Holbrook proposed four types of consumption experience: efficiency (active/extrinsic); excellence (of service quality) (reactive/extrinsic); aesthetic (reactive/intrinsic); and playfulness (active/intrinsic). The ability of AR, and different AR features, to provide experiential value along these different dimensions could be a useful avenue to explore. In this regard, Dacko's (2017) recent study provides a useful foundation. He found, through an analysis of the online descriptions of AR shopping apps available through Google Play's app store, that AR apps appear to primarily offer extrinsic or utilitarian value, although he noted that apps often provided at least some secondary intrinsic value. Given our findings here, this may mean that AR apps may not be fully exploiting the opportunities that providing more intrinsic value could produce.

Dacko (2017) also noted that consumers primarily seem to use apps because of the efficiency benefits they offer (i.e. extrinsic value). From our findings here, it would be useful to explore how the appeal of apps (in terms of their experiential value) may differ between consumers with different shopping motivations.

It should be noted that Holbrook (1996) also distinguished between experiences that are oriented to the self (i.e. the value pertains to me) or to others (i.e. value is derived from how it pertains to others). Whilst researchers have tended to focus on Holbrook's typology as it relates to self (Dacko, 2017; Mathwick *et al*., 2001), the extent to which AR can create social value (or, in Holbrook's terminology, "other") could also be an interesting avenue to explore given the increased connectedness of consumers through mobile devices (Pantano and Gandini, 2017).

We therefore propose that our model could be extended to consider how different AR features can be used to generate different types of experiential value and, in turn, how these different forms of experiential value influence affective and behavioral responses. In so doing, and drawing on previous studies of retail contexts, a number of moderating factors could be considered, such as shopping motivation (Childers *et al*., 2011; Chang *et al*., 2011), product involvement (Fiore and Kim, 2007), situational context (e.g. time pressure) (Fiore and Kim, 2007; Park *et al*., 1989), and product category. Of course, these are just a few potential influences. Furthermore, whilst this study has focused on purchase intention as the outcome variable, other outcomes such as customer satisfaction and loyalty could also be considered (Fiore and Kim, 2007). Figure 3 shows how our model could be extended to include the components suggested above. We hope that this framework will help guide theory development to better understand AR, and also potentially guide retailers in developing successful AR apps.

<<INSERT FIGURE 3 HERE>>

References

Abnett, K. (2016), "Stage experiences or go extinct", *businessoffashion.com*, (July), pp.1–7, available at: https://www.businessoffashion.com/community/voices/discussions/what-will-the-store-of-the-future-look-like/op-ed-stage-experiences-or-go-extinct [accessed 12 August 2016].

Alexander, B. and Nobbs, K. (2016), "Multi-sensory fashion retail experiences: The impact of sound, smell, sight and touch on consumer based brand equity", in Vecchi, A. and Buckley, C. (Eds), *Handbook of Research on Global Fashion Management and Merchandising*, IGI Global, Hershey, PA, pp. 420–443.

Arnold, M.J. and Reynolds, K.E. (2003), "Hedonic shopping motivations", *Journal of Retailing,* Vol. 79 No. 2, pp. 77–95.

Arnold, M.J. and Reynolds, K.E. (2012), "Approach and avoidance motivation: Investigating hedonic consumption in a retail setting", *Journal of Retailing,* Vol. 88 No. 3, pp. 399-411.

Augment (2015), "Virtual reality vs. augmented reality", available at: http://www.augment.com/blog/virtual-reality-vs-augmented-reality/ [Accessed July 14, 2016].

Azuma, R., Baillot, Y., Behringer, R., Feiner, S., Julier, S. and MacIntyre, B. (2001), "Recent advances in augmented reality", *IEEE Computer Graphics and Applications,* Vol. 21 No. 6, pp. 34–47.

Babin, B.J., Darden, W.R. and Griffen, M. (1994), "Work and/or fun: measuring hedonic and utilitarian shopping value", *Journal of Consumer Research,* Vol. 20 No. 4, pp. 644–656.

Bäckström, K. and Johansson, U. (2006), "Creating and consuming experiences in retail store environments: comparing retailer and consumer perspectives", *Journal of Retailing*

and Consumer Services, Vol. 13 No. 6, pp.417–430.

Bagozzi, R.P. and Yi, Y. (1988), "On the evaluation of structural equation models", *Journal of the Academy of Marketing Science*, Vol. 16 No.1, pp. 74–94.

Baker, J., Levy, M. and Grewal, D. (1992), "An experimental approach to making retail store environmental", *Journal of Retailing*, Vol. 68 No. 4, pp. 445-460.

Barclay, D.W., Higgins, C.A. and Thompson, R. (1995), "The partial least squares approach to causal modeling: personal computer adoption and use as illustration", *Technology Studies*, Vol. 2 No. 2, pp. 285-309.

Bulearca, M. and Tamarjan, D. (2010), "Augmented reality: a sustainable marketing tool?", *Global Business and Management Research: An International Journal*, Vol 2 No. 2-3, pp. 237-252.

Carmigniani, J. and Furht, B. (2011), "Augmented reality: An overview", in Furht, B. (Ed.), *Handbook of Augmented Reality*, Springer, New York, NY, pp.3-46.

Chang, H.J., Eckman, M. and Yan, R.N. (2011), "Application of the Stimulus-Organism-Response model to the retail environment: the role of hedonic motivation in impulse buying behavior", *The International Review of Retail, Distribution and Consumer Research*, Vol. 21 No. 3, pp. 233–249.

Childers, T.L., Carr, C.L., Peck, J. and Carson, S. (2001), "Hedonic and utilitarian motivations for online retail shopping behavior", *Journal of Retailing,* Vol. 77 No. 4, pp. 511-535.

Clarke, D.W., Perry, P. and Denson, H. (2012), "The sensory retail environment of small fashion boutiques", *Journal of Fashion Marketing and Management*, Vol. 16 No. 4, pp.492–510.

Dacko, S.G. (2017), "Enabling smart retail settings via mobile augmented reality shopping apps", *Technological Forecasting and Social Change*, Vol. 124, pp.243-256.

Deloitte (2016), *Retail Trends in 2016*, available at: https://www2.deloitte.com/content/dam/Deloitte/uk/Documents/consumer-business/deloitte-uk-consumer-review-march-2016.pdf [accessed September 27, 2017].

Dodds, W.B., Monroe, K.B. and Grewal, D., (1991), "Effects of price, brand, and store information on buyers' product evaluations", *Journal of Marketing Research*, Vol. 28 (June), pp. 307–319.

Donovan, R.J. and Rossiter, J.R. (1982), "Store atmosphere: an environmental psychology approach", *Journal of Retailing*, Vol. 58 No. 1, pp. 34–57.

Donovan, R.J. and Rossiter, J.R. (1994), "Store atmosphere and purchasing behavior". *Journal of Retailing*, Vol. 70 No. 3, pp. 283–294.

Duncan, E., Hazan, E. and Roche, K. (2013), "IConsumer: digital consumers altering the value chain", available at: https://www.mckinsey.com/~/media/mckinsey/industries/telecommunications/our%20insights/developing%20a%20fine%20grained%20look%20at%20how%20digital%20consumers%20behave/iconsumervaluechain.ashx

Eroglu, S.A., Machleit, K.A. and Davis, L.M. (2001), "Atmospheric qualities of online retailing: A conceptual model and implications", *Journal of Business Research*, Vol. 54 No. 2, pp. 177–184.

Fiore, A.M. and Kim, J. (2007), "An integrative framework capturing experiential and utilitarian shopping experience", *International Journal of Retail & Distribution Management*, Vol. 35 No. 6, pp. 421–442.

Fiore, A. M., Kim, J. and Lee, H. (2005), "Effect of image interactivity technology on consumer responses toward the online retailer", *Journal of Interactive Marketing,* Vol. 19 No. 3, pp. 38-53.

Fogg, B.J. (2003), *Persuasive Technology: Using Computers to Change What We Think and*

Do, Kaufmann, San Francisco, CA.

Forbes. (2016), "Shazam for beauty: Rimmel's new augmented reality app lets users nab real life make-up looks", available at: http://www.forbes.com/sites/rachelarthur/2016/07/04/shazam-for-beauty-rimmels-new-augmented-reality-app-lets-users-nab-real-life-make-up-looks/#2b52bcec5f4b [accessed July 14, 2016].

Grewal, D., Roggeveen, A.L. and Nordfält, J. (2017). "The future of retailing", *Journal of Retailing,* Vol. 93 No. 1, pp. 1-6.

Hayes, A.F. (2013), *Introduction to Mediation, Moderation, and Conditional Process Analysis: A Regression-Based Approach*, The Guildford Press, New York, NY.

Hirschman, E.C. and Holbrook, M.B. (1982), "Hedonic consumption: emerging concepts, methods and propositions", *Journal of Marketing*, Vol. 46 No. 3, pp. 92–101.

Hoffman, D.L. and Novak, T.P. (2009), "Flow online: lessons learned and future prospects", *Journal of Interactive Marketing*, Vol. 23 No. 1, pp. 23–34.

Holbrook, M. B. (1996). "Customer Value - A framework for analysis and research", *Advances in Consumer Research,* Vol. 23, No. 1, pp.138-142.

Holbrook, M.B. and Hirschman, E.C. (1982), "The experiential aspects of consumption: Consumer fantasies, feelings, and fun", *Journal of Consumer Research*, Vol 9 No. 2, pp. 132-140.

Hu, X., Huang, Q., Zhong, X., Davison, R. M. and Zhao, D. (2016), "The influence of peer characteristics and technical features of a social shopping website on a consumer's purchase intention", *International Journal of Information Management,* Vol. 36 No. 6, pp. 1218-1230.

Huang, E. (2012), "Online experiences and virtual goods purchase intention", *Internet Research*, Vol. 22 No. 3, pp.252–274.

Huang, T-L. and Liu, F.H. (2014), "Formation of augmented-reality interactive technology's persuasive effects from the perspective of experiential value, *Internet Research,* Vol. 24 No. 1, pp. 82-109.

Huang, T. and Liao, S.-L. (2015), "A model of augmented-reality interactive technology: the moderating role of cognitive innovativeness", *Electronic Commerce Research*, Vol. 15 No. 2, pp. 269-295.

Huang, T-L. and Liao, S.-L. (2017), "Creating e-shopping multisensory flow experience through augmented-reality interactive technology", *Internet Research*, Vol. 27 No. 2, pp. 449-475.

Hultén, B. (2011), "Sensory marketing: the multi-sensory brand-experience concept", *European Business Review*, Vol. 23 No. 3, pp. 256–273.

Hung, K., Chen, A.H., Peng, N., Hackley, C., Tiwsakul, R.A. and Chou, C. (2011), "Antecedents of luxury brand purchase intention", *Journal of Product and Brand Management*, Vol. 20 No. 6, pp. 457–467.

Javornik, A. (2014), "[Poster] Classifications of augmented reality uses in marketing", *IEEE International Symposium on Mixed and Augmented Reality*, IEEE, pp. 67–68.

Javornik, A. (2016a), "It's an illusion, but it looks real! Consumer affective, cognitive and behavioral responses to augmented reality applications", *Journal of Marketing Management*, Vol. 32 No. 9-10, pp. 987-1011.

Javornik, A. (2016b), "Augmented reality: Research agenda for studying the impact of its media characteristics on consumer behaviour", *Journal of Retailing and Consumer Services*, Vol. 30, pp. 252–261.

Javornik, A., Rogers, Y., Moutinho, A. M. and Freeman, R. (2016), "Revealing the shopper experience of using a 'magic mirror' augmented reality make-up application", *Proceedings of the 2016 ACM Conference on Designing Interactive Systems*, ACM,

pp. 871-882.

Jin, S.-A.A. (2009), "The roles of modality richness and involvement in shopping behavior in 3D virtual stores", *Journal of Interactive Marketing*, Vol. 23 No. 3, pp. 234–246.

Kim, J. and Forsythe, S. (2007), "Hedonic usage of product virtualization technologies in online apparel shopping", *International Journal of Retail & Distribution Management*, Vol. 35 No. 6, pp. 502–514.

Kim, J. and Forsythe, S. (2008), "Adoption of virtual try-on technology for online apparel shopping", *Journal of Interactive Marketing*, Vol. 22 No. 2, pp. 45–59.

Kim, A.J. and Ko, E. (2012), "Do social media marketing activities enhance customer equity? An empirical study of luxury fashion brand", *Journal of Business Research*, Vol. 65 No. 10, pp. 1480–1486.

Kotler, P. (1973), "Atmospherics as a marketing tool", *Journal of Retailing*, Vol. 49 No. 4, pp. 48–64.

Lee, H.-H., Fiore, A.M. and Kim, J. (2006), "The role of the technology acceptance model in explaining effects of image interactivity technology on consumer responses", *International Journal of Retail and Distribution Managemen*t, Vol. 34 No. 8, pp. 621-644.

Li, H., Daugherty, T. and Biocca, F. (2001), "Characteristics of virtual experience in electronic commerce: A protocol analysis", *Journal of Interactive Marketing*, Vol. 15 No. 3, pp. 13–30.

Li, H., Daugherty, T. and Biocca, F. (2002), "Impact of 3-D advertising on product knowledge, brand attitude, and purchase intention: The mediating role of presence", *Journal of Advertising*, Vol. 31 No. 3, pp. 43–57.

Lim, E.A.C. and Ang, S.H. (2008), "Hedonic vs. utilitarian consumption: A cross-cultural perspective based on cultural conditioning", *Journal of Business Research*, Vol. 61 No.

3, pp. 225–232.

Mathwick, C., Malhotra, N., and Rigdon, E. (2001). "Experiential value: conceptualization, measurement and application in the catalog and internet shopping environment", *Journal of Retailing*, Vol. 77 No. 1, pp. 39-56

Mehrabian, A. and Russell, J.A. (1974), *An Approach to Environmental Psychology*, MIT Press, Cambridge, MA.

Menon, S. and Kahn, B. (2000), "Cross-category effects of induced arousal and pleasure on the internet shopping experience", *Journal of Business Research*, Vol. 78 No. 2, pp. 31–40.

Milgram, P., Takemura, H., Utsumi, A. and Kishino, F. (1994), "Augmented reality: A class of displays on the reality-virtuality continuum", in Das, H. (Ed.), *Proceedings of SPIE Conference*: *Telemanipulator and Telepresence Technologies*, Vol. 2351 No. 26, available at: http://spie.org/Publications/Proceedings/Volume/2351.

Mintel Trends (2016), "Alternative realities", available at: http://academic.mintel.com.arts.idm.oclc.org/trends/?__cc=1#/trend/769426.

Moon, J., Chadee, D. and Tikoo, S. (2008), "Culture, product type, and price influences on consumer purchase intention to buy personalized products online", *Journal of Business Research*, Vol. 61 No. 1, pp. 31–39.

Morrin, M. and Chebat, J. (2005), "Person-place congruency: The interactive effects of shopper style and atmospherics on consumer expenditures", *Journal of Service Research,* Vol 8 No. 2, pp. 181-191.

Pantano, E., and Gandini, A. (2017), "Exploring the forms of sociality mediated by innovative technologies in retail settings". *Computers in Human Behavior,* Vol. 77, pp. 367-373.

Pantano, E. and Servidio, R. (2012), "Modeling innovative points of sales through virtual and

immersive technologies", *Journal of Retailing and Consumer Services,* Vol. 19 No. 3, pp. 279-286.

Papagiannidis, S., Pantano, E., See-To, E. W., Dennis, C. and Bourlakis, M. (2017). "To immerse or not? Experimenting with two virtual retail environments", *Information Technology and People,* Vol. 30 No 1, pp. 163-188.

Park, C.W., Iyar, E.S. and Smith, D.C. (1989), "The effects of situational factors on in-store grocery shopping behavior: the role of store environment and time available for shopping", *Journal of Consumer Research*, Vol. 15 No. 4, pp. 422-433.

Park, E.J., Kim, E.Y. and Forney, J.C. (2006), "A structural model of fashion-oriented impulse buying behavior", *Journal of Fashion Marketing and Management*, Vol. 10 No.4, pp. 433–446.

Pine, J. B. and Gilmore, J.H. (2011), *The Experience Economy,* updated edition, Harvard Business School Press, Boston. MA.

Poushneh, A. and Vasquez-Parraga, A. Z. (2017), "Discernible impact of augmented reality on retail customer's experience, satisfaction and willingness to buy", *Journal of Retailing and Consumer Services*, Vol. 34, pp. 229-234.

Rese, A., Schreiber, S. and Baier, D. (2014), "Technology acceptance modeling of augmented reality at the point of sale: Can surveys be replaced by an analysis of online reviews?", *Journal of Retailing and Consumer Services,* Vol. 21 No. 5, pp. 869-876.

Rese, A., Baier, D., Geyer-Schulz, A. and Schreiber. S. (2016), "How augmented reality apps are accepted by consumers: A comparative analysis using scales and opinions", *Technological Forecasting and Social Change*, Vol. 124, pp. 306-319.

Scholz, J. and Smith, A.N. (2016), "Augmented reality: designing immersive experiences that maximise consumer engagement", *Business Horizons,* Vol. 59, pp. 149-161.

Srinivasan, S.R. and Srivastava, R.K. (2010), "Creating the futuristic retail experience

through experiential marketing: Is it possible? An exploratory study", *Journal of Retail and Leisure Property*, Vol. 9 No. 3, pp. 193–199.

Steuer, J. (1992), "Defining virtual reality: dimensions determining telepresence", *Journal of Communication*, Vol. 42 No. 4, pp. 73-93.

Stevens, J. (1996), "*Applied Multivariate Statistics for the Social Sciences*", 3rd ed., Lawrence Erlbaum, Mahwah, NJ.

Sweeney, J., Soutar, G.N. and Johnson, L.W. (1999), "The role of perceived risk in the quality-value relationship: A study in a retail environment", *Journal of Retailing*, Vol. 75 No. 1, pp. 77–105.

Tabachnick, B.G. and Fidell, L.S. (2001), *Using Multivariate Statistics*, 4th ed., Harper Collins, New York, NY.

To, P., Liao, C. and Lin, T. (2007), "Shopping motivations on internet: A study based on utilitarian and hedonic value", *Technovation,* Vol. 27 No. 12, pp. 774-787.

van Noort, G., Voorveld, H.A.M., and van Reijmersdal, E.A. (2012), "Interactivity in brand web sites: Cognitive, affective, and behavioral responses explained by consumers' online flow experience", *Journal of Interactive Marketing,* Vol. 26 No. 4, pp. 223-234.

Verhoef, P.C., Kannan, P.K. and Inman, J.J. (2015), "From multi-channel retailing to omni-channel retailing. Introduction to the special issue on multi-channel retailing", *Journal of Retailing*, Vol. 91 No. 2, pp. 174-181.

Wang, C., Chen, Z., Chan, A.K.K. and Zheng, Z. (2000), "The influence of hedonic values on consumer behaviors", *Journal of Global Marketing*, Vol 14 No. 1, pp. 169–186.

Wu, W., Lee, C., Fu, C. and Wang, H. (2013), "How can online store layout design and atmosphere influence consumer shopping intention on a website?", *International Journal of Retail & Distribution Management,* Vol 42 No. 1, pp. 4-24.

Yaoyuneyong, G., Foster, J., Johnson, E. and Johnson, D. (2016), "Augmented reality

marketing: Consumer preferences and attitudes toward hypermedia print ads", *Journal of Interactive Advertising*, Vol. 16 No. 1, pp. 16-30.

Table I. Experiential retail technologies: AR practices.

Retailer	AR implementation
Burberry *Beauty*	• "Digital Runway Nail Bar" placed in beauty concept store. • Enabled consumers to virtually try on nail colors with augmented reality technology.
Topology *Eyewear*	• Users upload a video selfie (looking front, then left and right) that is used to create a 3D scan of their face. • Enabled users to design customized glasses that fit them specifically.
Walgreens *Pharmacy*	• Piloted AR app that could be attached to the shopping cart to help users navigate the store. • The app enabled personalized coupons, offers, and rewards to "pop out" of the shelf as customers walked around a store. Customers could also collect loyalty rewards for walking down particular aisles.
Topshop *Fashion*	• Augmented reality try-on mirrors. • Consumers could virtually try on clothes and explore different styles.
Dulux *Homeware*	• The Dulux Visualizer enabled users to "paint" the walls of their rooms as they moved around with their mobile devices. • Users could select, store, and view different color schemes and also share the images with friends through the app.
Net-a-porter *Fashion*	• Autumn 2011 print campaign with integrated AR abilities. • By scanning campaign images with an AR app, consumers got access to video interviews and fashion tips.
Ikea *Homeware*	• Summer 2013 launched an AR catalogue. • Gave customers a virtual preview of furniture in their room. The user placed the printed version of the catalog in the spot where they intend to put the new furniture and then, using the device's camera, the AR app placed the furniture into the room, using approximate dimensions.
Converse *Fashion*	• AR app. • Enabled consumers to playfully try on virtually any shoe and purchase them.
Rimmel *Beauty*	• AR app. • Enabled consumers to virtually try on makeup products and purchase them.

Table II. Means, standard deviations and correlations of the variables (AVE in italics).

Variables	Mean	SD	1	2	
1) Hedonic motivation	4.41	1.46	*0.89*		
2) Positive affective response	4.28	1.10	0.482***	*0.81*	
3) Purchase intention	3.62	1.17	0.372***	0.520***	*0.84*

Note: *** p=0.01.

Table III. Linear regression results (purchase intention).

	B	SE	t statistic	LLCI	ULCI	Adjusted R-square
Model 1						
Constant	3.293	0.137	24.105***			
Augmentation (dummy)	0.653	0.195	3.344***	0.2670	1.040	0.078
Model 2						
Constant	1.213	0.372	3.261***	0.477	1.949	
Augmentation (dummy)	0.037	0.203	0.185	−0.364	0.439	
Positive affective response	0.554	0.094	5.917***	0.369	0.739	0.271

Note: *** p=0.01.

Table IV. Linear regression results with moderator (positive affective response).

	B	SE	t statistic	LLCI	ULCI	R-square
Constant	4.308	0.064	67.292***	4.182	4.435	
Augmentation	1.174	0.128	9.169***	0.921	1.428	
Hedonic motivation	0.376	0.044	8.508***	0.289	0.464	
Augmentation*hedonic motivation	0.227	0.088	2.574**	0.053	0.402	0.545

Notes: *** p=0.01; ** p=0.05.

Figure 1
Conditional effects of augmentation on positive affective response

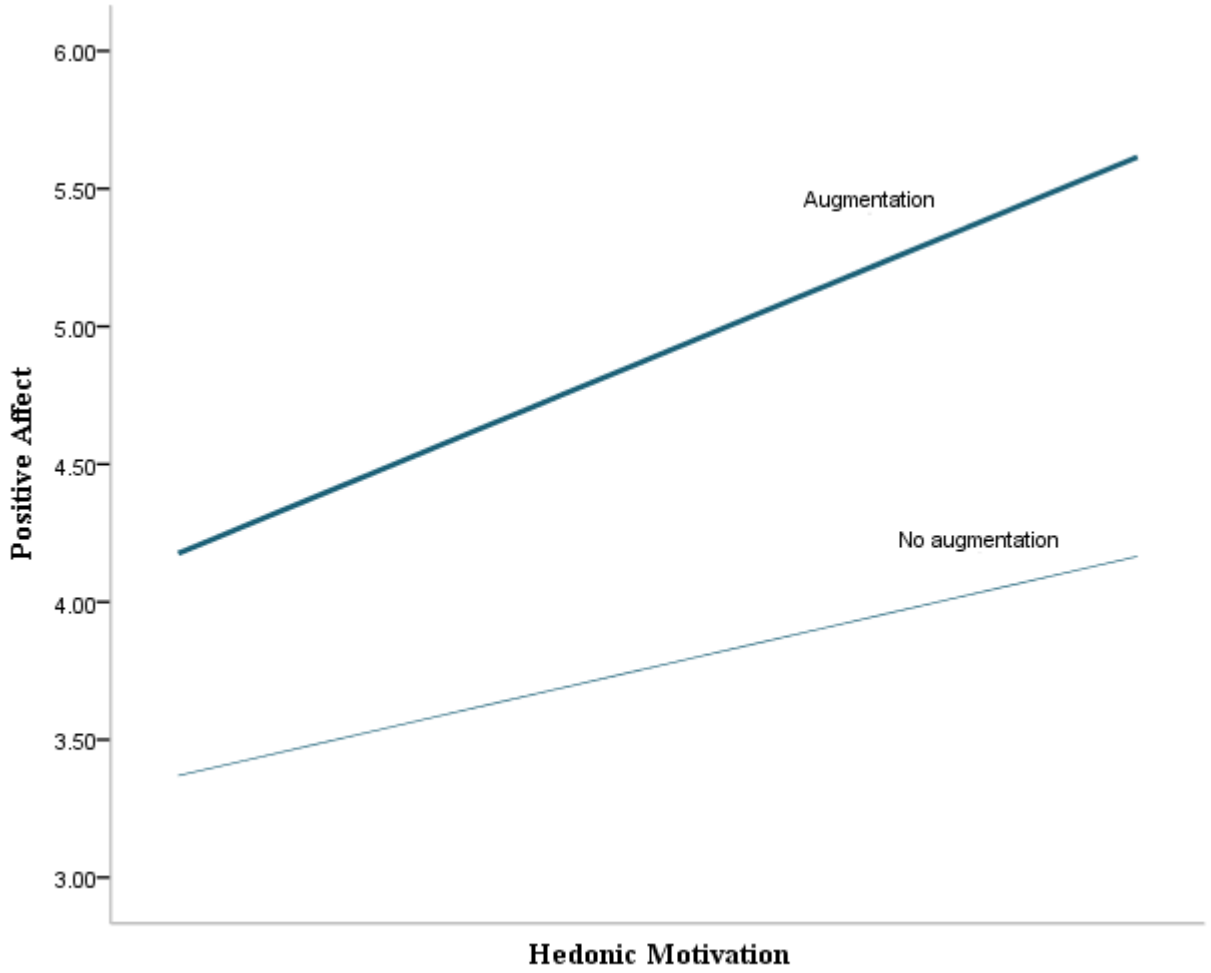

Figure 2
Model with causal paths

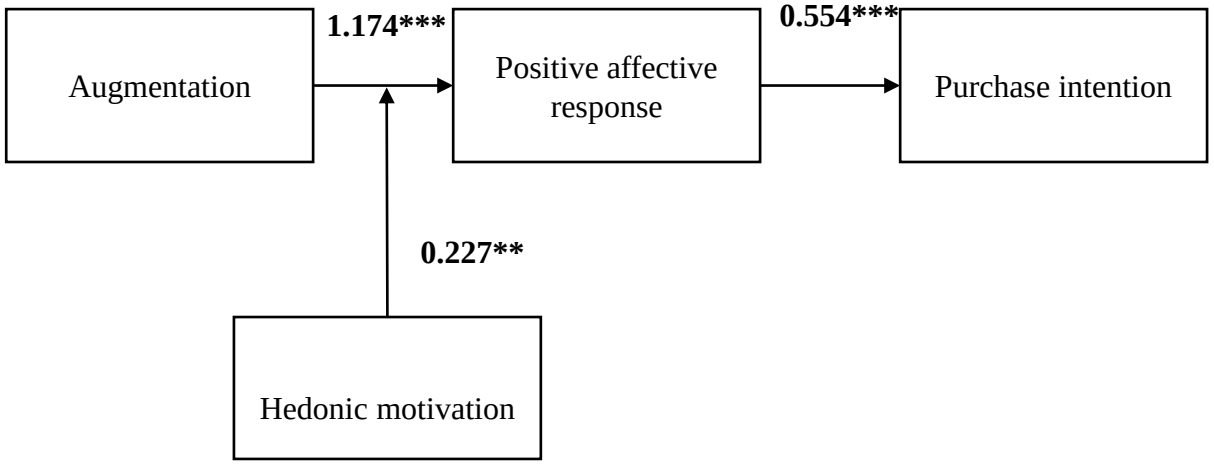

Figure 3
Proposed framework