Gathering pre-purchase information for a cruise vacation with virtual reality: The effects of media technology and gender

Abstract

Purpose: Our study's aim was to apply theory on consumer learning in virtual experiences to compare how media technologies (i.e., virtual reality [VR] and standard websites) and users' gender influence the ways in which tourists gather pre-purchase information.

Design/methodology/approach: A laboratory experiment with fully immersive VR was conducted to examine consumers' behavior in gathering pre-purchase information. The sample comprised 128 consumers who had taken a cruise vacation or who were considering purchasing a cruise package in the near future.

Findings: The results generally reveal the central role of the feeling of presence, which in turn positively impacts users' enjoyment and aspects of consumer learning (i.e., brand attitude, product knowledge, and purchase intent). In particular, the results suggest that compared with standard websites, VR facilitated the tourists' learning as consumers, especially among women, who tend to dominate the information-gathering stage of planning family vacations.

Practical implications: The results imply that travel agencies and tourism centers working with cruise vacation companies should incorporate VR in order to make their offers more attractive, especially to women.

Originality: Our study was the first to apply theory on consumer learning in the cruise tourism industry, specifically to compare fully immersive VR devices versus standard websites and gauge the effect of gender.

Keywords: Virtual reality, Virtual experience, Presence, Consumer learning, Cruise tourism, Gender

1. Introduction

In tourism marketing, recently developed technologies such as VR are reshaping the consumer's experience in(Beck *et al.*, 2019; Flavián *et al.*, 2021). In the pre-purchase stage, VR is considered to be an especially useful promotional tool for providing potential travelers with a sensory simulation of the travel experience before the trip takes place (Lee, 2018; Spielmann and Orth, 2020).

Along with calls for empirical studies on VR (Flavián *et al.*, 2021; Griffin *et al*., 2017; Loureiro *et al*., 2020; Yung and Khoo-Lattimore, 2019), recent literature reviews on the use of VR in tourism have revealed that the overwhelming emphasis on destinations has left other tourism products unexamined (Moro *et al.*, 2019; Wei, 2019; Yung and Khoo-Lattimore, 2019). For instance, although the cruise industry generated a worldwide economic impact of US $134 billion in 2017 (Cruise Lines International Association, 2018a), researchers have overlooked VR's role in the cruise sector (Loureiro *et al*., 2020). Beyond that, much of the research on VR in tourism marketing and advertising has focused on non-immersive VR, which uses virtual tours that rely on simple panoramic photographs or 360° views (e.g., Spielmann and Orth, 2020; Yeh *et al.*, 2017). The dramatic improvement in VR technologies since their emergence, however, suggests that other advances, including fully immersive VR devices, may afford even more intense experiences for users (De Gauquier *et al.*, 2019; Leung *et al.*, 2020; Spielmann and Orth, 2020). Against that background, our study contributes to reducing the current dearth of empirical studies analyzing how new technologies such as fully immersive VR may impact the behavior of consumers and tourists compared with traditional media technologies (Spielmann and Orth, 2020; Yung *et al*., 2021).

VR's effectiveness in improving attitudes and behavioral responses is usually attributed to the concept of *presence* (Steuer, 1992; Tussyadiah *et al*., 2018), defined as a subjective psychological state in which a user feels immersed in a mediated environment (Tussyadiah *et al*., 2018). By extension, a *mediated environment* refers to any virtual 3D environment (e.g., cruise ship or hotel room) that a user can navigate and possibly interact with (Guttentag, 2010). Despite the pervasiveness of the concept of presence in studies on VR, the work of exploring and adapting presence for tourism marketing remains in its infancy (Yung *et al*., 2021). Along those lines, our study substantiates the importance of presence to improving consumer learning in the context of tourism. Along other lines, studies analyzing how sociodemographic variables may affect the experience of purchasing tourism products with VR have been few (Errichiello *et al.*, 2019; Loureiro *et al.*, 2019, 2020). Regarding gender, for example, men and women may differ in how they experience mediated environments and in their reported levels of presence (Felnhofer *et al.*, 2012). However, other findings have indicated large heterogeneity between men and women depending on the specific technology used and task to be completed (Felnhofer *et al.*, 2012; Grassini and Laumann, 2020). Therefore, investigating how gender may affect travelers' pre-purchase stage when the stage involves VR could provide several insights for academics and managers alike (Errichiello *et al*., 2019).

Given those gaps in the literature, the primary objective of our study was to offer empirical evidence of how VR affects consumers' decision-making in the pre-purchase stage of buying a cruise vacation in light of the gender of the tourist gathering the pre-purchase information. In that way, our work makes three major contributions. First, we have applied theory on consumer learning in virtual experiences to the cruise tourism industry in order to study the role of emotions (i.e., enjoyment) and the antecedents of presence (i.e., media richness and interactivity) in an integrated model, as well as how presence and enjoyment affect variables of consumer learning (i.e., product knowledge, brand attitude, and purchase intent). Second, we have compared how different media technologies, namely fully immersive VR and standard websites, impact how pre-purchase information is gathered. Third and last, we have analyzed how the role of gender may affect the variables that we studied. To our knowledge, our work thus marks the first empirical study to analyze the implications of VR in the pre-purchase stage of a cruise vacation and the first to consider the role of gender in that context.

2. Theoretical framework and hypotheses

In theory on consumer learning in virtual experiences (Klein, 2003; Li *et al.*, 2001a, 2002), *consumer learning* includes different processes which may cause changes in consumer's memory and behavior as a consequence of information processing (Arnould *et al.*, 2002). The theory is based on the concept of (tele)presence (Steuer, 1992) and its effects on variables of consumer learning such as product knowledge, brand attitude, and purchase intent. Although the theory has been applied primarily in advertising and e-commerce (Debbabi *et al.*, 2010; Klein, 2003; Li *et al*., 2001b, 2002), we applied it to examine the impact of VR in relation to another media technology: the standard website.

2.1 Virtual experience and presence

Although a virtual experience can be elicited by several digital technologies, in our study we focused on fully immersive VR, which ranks among the tools that enable the highest level of presence among consumers (Gutiérrez *et al.*, 2008; Yung *et al*., 2021). VR makes users feel physically present in mediated environments (Steuer, 1992; Tussyadiah *et al*., 2018), that is, affords them *presence*, a subjective psychological state in which an individual feels immersed in a mediated environment. The construct of presence is complex and formed via the interplay of multisensory information and various cognitive processes (Diemer *et al.*, 2015; Yung *et al*., 2021). Tussyadiah *et al*.'s (2018) review of literature addressing the concept of presence, including its measurement and dimensions, has shown that the construct is typically considered to be pivotal in explaining VR's effectiveness in various contexts of use (cf. Yung *et al*., 2021). In our study, two antecedents of presence were central in our analysis—media richness and interactivity—and we also examined its impact on enjoyment and both its and enjoyment's ramifications for consumer learning (i.e., product knowledge, brand attitude, and purchase intent).

2.1.1 Antecedents of presence

The sense of presence is usually determined with reference to two general categories of variables: media characteristics and user characteristics (Baños *et al*., 2004). On the one hand, media characteristics are divided into variables of media form and media content (Lessiter *et al.*, 2001). Whereas *media form* refers to the properties of a display device, *media content* refers to the actors, objects and events depicted by the medium (Baños *et al*., 2004). On the other, *user characteristics* include individual aspects such as gender, age and prior experience with mediated experiences (Baños *et al*., 2004). Our study focused on media form, namely how different media formats (i.e., VR vs. websites) affect presence by affecting two of its known antecedents: media richness and interactivity (Steuer, 1992).

The first of those antecedents, *media richness*, refers to a technology's ability to produce a rich, sensorial mediated environment given its formal features (Klein, 2003). Namely, how an environment display information to the senses (Steuer, 1992). It deals with the quality or transparency that the technology offers by itself. For instance, the high definition offered by the latest 5K-resolution videos affords the technology greater media richness than its predecessors and, in turn, provides a higher level of presence (Steuer, 1992), because the more vivid the information, the less that users need to imagine (Shih, 1998). Empirical studies manipulating the levels of websites' media richness have indeed revealed the significant positive association between media richness and presence (Shen and Khalifa, 2012; Vonkeman *et al.*, 2017). In view of that background, we first hypothesized that:

H1: Higher levels of media richness increase perceptions of presence.

The second antecedent of presence, *interactivity*, denotes the level to which users are able to modify the content and form of the mediated environment in real time (Steuer, 1992). Traditional communication media such as brochures offer highly limited interactivity or feedback compared with new communication technologies such as VR. In general, the more that a user can interact with and through the technology, the likelier they are to gain a sense of presence (Shih, 1998), as several studies have shown (Hyun and O'Keefe, 2012; Li *et al.*, 2002; Steuer, 1992; Vonkeman *et al.*, 2017). Thus, we also hypothesized that:

H2: Higher levels of interactivity increase perceptions of presence.

2.1.2 Consequences of presence and enjoyment in consumer learning

Presence is usually considered to be the perceptual baseline of virtual experience and a causal factor of information processing and other responses among consumers when they interact with mediated environments (Kim and Biocca, 1997; Lee, 2018; Li *et al.*, 2001a; Yung *et al.*, 2021). As Yung *et al.* (2021) have recently shown, the most prominent psychological effects of greater presence are greater delight and greater enjoyment. Even so, because previous research on presence has generally been conducted in the context of information communication technology (ICT), it has largely focused on how presence affects system performance and, as a consequence, overlooked the effects of presence on real-world performance in contexts such as tourism marketing (Yung *et al.*, 2021). However, for consumers' decision-making processes, VR experiences offer high levels of presence that are usually associated with feelings of enjoyment (Li *et al.*, 2001a). In turn, if VR users enjoy interacting with the virtual environment or the

product therein, then experiences that offer high levels of presence virtually are themselves perceived and expected to be more enjoyable (Pallavicini *et al.*, 2020; Sylaiou *et al.*, 2010; Yung *et al.*, 2021). As a case in point, in their study on how consumers experienced a virtual tour of several tourism destinations with VR, Tussyadiah *et al.* (2018) found that the sense of presence indeed increased enjoyment during the experience. Thus, our third hypothesis was that:

H3: Higher levels of presence increase the feeling of enjoyment.

Beyond its effects on emotions, presence has also been analyzed as a construct that affects consumer learning (Debbabi *et al*., 2010; Lau and Lee, 2016; Li *et al*., 2002; Suh and Lee, 2005). Effective consumer learning, has traditionally been examined in three dimensions: the cognitive, the affective, and the conative (Lavidge and Steiner, 1961). The cognitive dimension entails whether product information improves consumer comprehension, usually measured in terms of product knowledge (Bettman and Park, 1980). By contrast, the affective dimension captures the extent to which consumers' attitudes are affected by certain stimuli (MacKenzie and Lutz, 1989). Last, the conative dimension deals with behavioral responses to several determinants such as purchase intent (Suh and Lee, 2005).

Several researchers have empirically tested the ways in which presence affects those three dimensions. Klein (2003), for instance, found that as the level of presence experienced rose, beliefs about product attributes became more strongly held, and attitudes toward the product intensified. In the context of advertising with non-immersive VR, Li *et al.* (2002) observed that 3D visualization heightened the sense of presence, which positively impacted product knowledge and brand attitude to a significant degree but not purchase intent. Similar results reported by Suh and Chang (2006) included that VR interface produced the highest level of presence and, in turn, augmented consumers' product knowledge, attitudes, and purchase intent. In tourism, Tussyadiah *et al*. (2018) found that the feeling of presence during a VR experience positively impacted attitudes toward the featured tourism destination. In cruise tourism in particular, the onboard environment has been shown to significantly affect perceived value, overall satisfaction, and behavioral intentions (Calza *et al.*, 2020). Considering all of those findings, we formulated a fourth hypothesis:

H4: Higher levels of presence increase the levels of (a) product knowledge, (b) brand attitude, and (c) purchase intent.

Researchers have also emphasized the relevance of emotional experiences, which influence and predict consumers' behavioral responses in the pre-purchase stage (Goossens, 2000; Prayag *et al.*, 2013). Although enjoyment is clearly a primary effect heightened during virtual experiences (Lau and Lee, 2016; Li *et al.*, 2001a), most previous research has focused on presence's effects on consumers' responses, thereby leaving the hedonic consequences of 3D mediated experiences unexplored (Yung *et al.*, 2021). Nevertheless, several authors have provided some evidence that enjoyment may affect consumers' responses. In online environments, the particular features arising from virtual experiences (e.g., media richness and interactivity) provide enjoyment, and such enjoyment consequently increases the time spent on the website (Kim *et al.*, 2007), as well as consumers' attitudes toward the online retailer and their willingness to purchase from them (Fiore *et al.*, 2005; Kim *et al.*, 2007, 2013; Lee *et al.*, 2014; Xu *et al.*, 2020). In tourism, Shin and Jeong (2021) have recently analyzed factors of travelers' motivation to adopt augmented reality (AR) applications at tourism destinations and shown that perceived enjoyment and playfulness during the experience prompted favorable attitudes and the intention to use AR applications at tourism destinations. Examining fully immersive VR, Tussyadiah *et al.* (2018) observed enjoyment's positive direct effect on consumers' attitudes and their intention to visit the real-world destination featured in the VR experience. Such findings suggest that an increased feeling of pleasure or excitement experienced during virtual walkthroughs generates a positive intention to experience a real-world walkthrough. Thus, our fifth hypothesis was that:

H5: Higher levels of enjoyment increase the level of (a) product knowledge, (b) brand attitude, and (c) purchase intent.

Based on the foregoing literature review, we proposed a research model that includes the first set of hypotheses, as shown in Figure 1.

(Figure 1 about here)

2.2. Comparing VR with website visualization

On the subject of online experiences, Bleier *et al.* (2019) have shown that the design elements of webpages shape the entire online experience for consumers but that the type of product (search vs. experience) moderates the influence of each dimension of that experience (i.e., informativeness, entertainment value, social presence, and sensory appeal) on the online purchase. Among the specific online features analyzed in their study, product videos or content using both audio and dynamic visuals to present the information (e.g., VR and AR) achieved the strongest effects in the sensory dimension (Bleier *et al.*, 2019). Likewise, studies in marketing and advertising comparing non-immersive desktop-based VR systems with traditional formats (e.g., pictures, videos, and text) have shown that users tend to better comprehend products when presented in VR formats (Algharabat, 2014; Fiore *et al.*, 2005; Lee *et al.*, 2012; Li *et al.*, 2002; Suh and Chang, 2006; Suh and Lee, 2005).

Despite those insights, empirical research on how more advanced mediated technologies such as fully immersive VR may influence consumers' behavior has been rare (Spielmann and Orth, 2020; Stipp, 2018). However, VR with fully immersive devices makes the virtual experience quite different from that offered by their non-immersive counterparts, including 3D product advertising (De Gauquier *et al*., 2019; Guttentag, 2010). Whereas the latter provide no immersion and only limited media richness and interactivity, fully immersive VR enables not only immersion but also more active participation (Guttentag, 2010). As a result, the latest VR devices offering fully immersive options can afford more intense experiences and feelings of presence than their non-immersive predecessors (Gutiérrez *et al.*, 2008), and experiencing such high levels of presence can cause users to remember the environment represented virtually as a place, not a series of pictures (Slater *et al.*, 1999). As mentioned, presence often determines VR's effectiveness in various contexts of use (Tussyadiah *et al.*, 2018; Yung *et al*., 2021), because presence is usually associated with performance (Grassini and Laumann, 2020). To achieve such levels of presence, VR headsets tap into the human senses more than non-immersive devices and thus heightens emotional states and sensory experiences (Kim *et al.*, 2020; Petit *et al.*, 2019). In research on VR visualization, Flavián *et al*. (2021) found that participants reported the highest levels of emotional reactions and psychological and behavioral engagement when using VR technology. Thus, a VR experience can be expected to provide a more pronounced sensation of presence and enjoyment than website visualization, which in turn intensifies consumers' cognitive, affective, and behavioral responses (De Gauquier *et al.*, 2019). Our sixth hypothesis thus anticipated that:

H6: VR visualization results in a greater sense of (a) media richness, (b) interactivity, (c) presence, (d) enjoyment, (e) product knowledge, (f) brand attitude, and (g) purchase intent than website visualization.

2.3. Comparing men's and women's perceptions in mediated environments

Although the virtual experience ultimately depends on technological factors (e.g., media form and content) and user characteristics such as prior experience, age, or gender (Baños *et al.*, 2004; Gutiérrez *et al.*, 2008), research on how user characteristics affect immersive mediated experiences has been limited (Loureiro *et al.*, 2019, 2020). In fact, to the best of our knowledge, no studies have assessed how men and women behave when gathering pre-purchase information using VR versus a standard website, despite some findings regarding other mediated technologies, including radio and television (Darley and Smith, 1995; Holbrook, 1986). Added to those findings, research on ICT has confirmed that users tend to adopt and use technology differently depending on their sociodemographic features, including gender and age (Devolder *et al.*, 2012; Gefen and Straub, 1997). Later studies revealed that women connect while using mediated technology more than men (Kimbrough *et al*., 2013) and use social networking sites at greater rates than them as well (Muscanell and Guadagno, 2012).

Concerning the effects that gender may cause in environments mediated by VR, research has shown that men and women may experience such environments differently and report differing levels of presence (Felnhofer *et al.*, 2012). Although the same research suggests that men generally report a higher sense of presence and more perceived realism than women in mediated environments (Felnhofer *et al.*, 2012), Dirin *et al*. (2019) more recently observed that women adopted AR and VR applications and video clip technology more readily than men. Added to that, considering that emotional response is an important factor in adopting new technology, their results also included that women tended to find VR more exciting and more inspirational and felt more intense emotional responses from it than men did. Women have also proven to be more affected by emotional information in simulated environments (Mousas *et al*., 2018), and to

perceive a greater sense of presence (Narciso *et al*., 2019), which in other studies have allowed them to outperform men on tasks involving localization and memory (Liang *et al*., 2019). Because performance and a sense of presence are often connected (Grassini and Laumann, 2020), women's high sense of presence and emotionality in fully immersive VR environments (Dirin *et al*., 2019; Grassini and Laumann, 2020) may explain their superior performance on those tasks. Even in the context of cruise tourism, women have demonstrated more sensitivity to the onboard environment than men (Calza *et al.*, 2020). Given all of those trends and findings, we last hypothesized that:

H7: Women have higher perceptions of (a) media richness, (b) interactivity, (c) presence, (d) enjoyment, (e) product knowledge, (f) brand attitude, and (g) purchase intent than men.

3. Methodology

3.1 Study design and stimuli

To test our hypotheses, we developed a laboratory experiment to observe how tourists gathered information while shopping for a cruise vacation. The experiment followed a between-subject design wherein each participant was exposed to only one of two treatments. Between those treatments, only one variable was modified—visualization format—, which was either via VR or a standard website. Whereas the media form was thereby manipulated, the media content, all developed specifically for the purpose of the study, remained constant in both treatments. To increase external validity, all information presented was extracted from a real cruise company, and to allow full VR immersion, the VR device used was HTC Vive, a fully immersive head-mounted display. Of tourism products that we could have examined, we chose cruises because they exhibit superior growth and because they have not been investigated in relation to VR in previous studies (Loureiro *et al*., 2020).

Our convenience sampling method involved snowballing based on quotas established with reference to the Spanish cruise profile indicated by Cruise Lines International Association (2018b). Certain traits among participants were targeted in order to best represent the population under study in terms of age and gender. To encourage participation, participants were given 10 euros to spend in a well-known department store after their participation in the experiment.

3.2 Procedure

The experiment was divided into three stages. In Stage 1, participants in both treatments were introduced to the purpose of the study—that is, to analyze consumers' behavior in the context of buying a cruise. All participants were next exposed to the website of a cruise company containing information about a specific cruise (e.g., price, brand, ship, itinerary, and destinations). Figure 2 illustrates some screenshots of the website.

(Figure 2 about here)

In Stage 2, participants in both treatments were exposed to three specific areas of the ship in detail—a cabin's interior, a balcony cabin, and the outdoor pool—all of which are considered to be important factors for consumers when shopping for cruise vacations (Petrick, 2005; Petrick *et al*., 2007). For the experimental manipulation, the control group was exposed to a website showing several pictures of each area, whereas the experimental group was exposed to the same areas visualized in VR. During the VR stimulus, participants experienced a virtual walkthrough during which they could freely tour and inspect the three areas of the ship in an interactive, fully immersive way thanks to the head-mounted display. The content of the VR visualization was a representation of a real cruise ship, the *MSC Musica*. Because our objective was to compare the effects of the visualization of information, to ensure that both treatments had the same content we extracted pictures for the website treatment from the VR representation. Figure 3 illustrates the experimental stimulus for both treatments.

(Figure 3 about here)

Last, in Stage 3, participants in both treatments completed the same questionnaire addressing the research variables and their sociodemographic information as a means to segment the sample and control for possible

cofounding variables. The measurement instruments that we employed have been validated in prior studies, as shown in Table I.

(Table I about here)

In the VR treatment, before Stage 1 participants completed a 5-minute demo to familiarize themselves with the technology. To avoid overexposure during the experiment, exposure times were the same in both treatments. That is, in Stage 1 participants could explore the website for 5 minutes, and during Stage 2, the duration was restricted to 5 minutes in both treatments. During Stage 3, however, participants had as much time as needed to complete the questionnaire. In that way, we ensured that participants in both treatments had the same information and the same amount of time in order to improve internal validity. Ultimately, each participant's time spent on the experiment was between 20 and 25 minutes.

4. Results

4.1 Sample

Our sample of 128 participants—62 in the website treatment and 66 in the VR treatment—met the Spanish cruise tourist profile indicated by Cruise Lines International Association (2018b). In 2017, the average Spanish cruise tourist was 44 years old and selected a Mediterranean route lasting 7.5 days. Likewise, the mean age of participants in the website treatment was 45.26 years and in the VR treatment was 45.33 years. Gender was also quite balanced between the treatments. Table II displays the complete sociodemographic information of the participants.

(Table II about here)

Because prior research has suggested that sociodemographic variables may influence individuals' perceptions and use of information technology (Suh and Lee, 2005), we first examined whether demographic differences explained any variance in the dependent variables. Multivariate regression analyses revealed the significant covariate effects of gender only (p= 0.036, according to the Shapiro–Wilks test); thus, the homogeneity of gender across the two treatments was examined. The results of a chi-square test revealed no significant difference in gender (χ^2 = 0.29, p = 0.59), thereby indicating that differences between the experimental groups were caused by the manipulation, not by sociodemographic variables.

4.2 Test of the structural model

Due to our sample's limited size, variance-based methods such as partial least squares analyses were best suited to our study's aims (Chin, 1998; Fornell and Bookstein, 1982). We therefore estimated a partial least squares model using SmartPLS 3.0 (Ringle *et al.*, 2015). Beforehand, the psychometric properties and discriminant validity of the measurement model were checked, and all indicators confirmed reliability and discriminant validity, as shown in Tables III–V.

(Table III about here)

(Table IV about here)

(Table V about here)

The results of the structural model appear in Table VI. Presence was considered to be a second-order construct comprising two first-order factors—self-presence and possible actions—whose dimensions became the observed indicators of the second-order construct in a two-step analysis using latent variable scores. Among the results, higher levels of media richness and interactivity significantly increased perceived presence, which supported *H1* and *H2*, and consequently increased enjoyment, product knowledge, brand attitude, and purchase intent, which supported *H3*, *H4a*, *H4b*, and *H4c*. Beyond that, high levels of enjoyment caused high levels of brand attitude, which supported *H5b*. However, because our results did not provide support for *H5a* and *H5c*, the influence of enjoyment on product knowledge and purchase intent could not be confirmed. Although consumers have been shown to experience psychological states such as enjoyment and pleasure in interactive mediums and thus to demonstrate increased learning or altered behaviors (Eroglu *et al.*, 2003; Flavián *et al*., 2021), in our study enjoyment significantly affected brand attitude but not product knowledge or purchase intent.

(Table VI about here)

4.3 Comparing the effects of media technology and gender

To test hypotheses *H6* and *H7*, we conducted a one-way ANOVA for every variable studied (i.e., media richness, interactivity, presence self-location and possible actions, enjoyment, product knowledge, brand attitude, and purchase intent) according to the visualization and gender. According to the results, shown in Table VII, because the interaction effects (i.e., visualization format × gender) were not significant for any of the variables, the rest of the analysis focused solely on the main effects. Those results revealed that all of the hypotheses in *H6* found support except *H6g* (i.e., purchase intent), which underscores the superiority of VR over the website in consumer learning (i.e., product knowledge and brand attitude) and in the level of enjoyment. In reference to the non-significant differences for purchase intent, the results were consistent with other studies that have shown significant differences in product knowledge and brand attitude but not in purchase intent following the use of 3D versus 2D desktop visualization (Fiore *et al*., 2005; Li *et al.*, 2002). Concerning the effects of gender, all hypotheses in *H7* found support except *H7b* (i.e., interactivity) and *H7g* (i.e., purchase intent), thereby confirming higher perceptions among women than men in nearly every variable that we studied. The non-significant results for interactivity and purchase intent were not surprising, for previous studies on mediated environments have revealed a range of results for those variables (Felnhofer *et al.*, 2012; Grassini and Laumann, 2020). Last, considering the visualization format and gender, the highest values emerged in the VR treatment and among women, which suggests that VR is the most persuasive medium for improving tourists' consumer learning and enjoyment and that those effects are more pronounced for women than men. Figure 4 illustrates the results (i.e., means) for every variable for both visualization mediums and genders.

(Table VII about here)

(Figure 4 about here)

5. Discussion and conclusions

5.1 Conclusions

Our study contributes to reducing the current shortage of empirical studies analyzing how new technologies such as fully immersive VR and user characteristics such as gender may impact consumers' decision-making. In particular, our study makes three major contributions. First, the results from the structural model confirm that theory on consumer learning can be applied in examining mediated experiences in the context of buying a cruise vacation. Most of the relationships proposed in the structural model were supported, except for the ones between enjoyment and both product knowledge and purchase intent. Following research showing that the ultimate virtual experience elicited in consumers depends upon context (Bleier *et al.*, 2019; Grassini and Laumann, 2020; Li *et al.*, 2002; Yung *et al*., 2021), a possible explanation for those results may derive from the complex nature of the product analyzed, because cruise products are considered to be some of the most complex products offered in the tourism sector (Castillo-Manzano and López-Valpuesta, 2018; Castillo-Manzano *et al.*, 2015). Against that complexity, the limited content and time span offered to participants in the experiment could have prevented them from performing extensive information searches. Another explanation could be that the impact was indirect, which would follow Papagiannidis *et al.*'s (2014) finding of an indirect link between enjoyment and purchase intention. To be specific, they found that enjoyment was positively associated with the user's satisfaction when driving a simulated car, which in turn impacted the user's intent to purchase the car. All of those hypotheses should be addressed in future studies.

Second, our results indicate the superiority of VR over the website format in most of the variables that we studied and, in turn, the persuasiveness of VR technology. Only in relation to purchase intent were the differences not significant in terms of visualization format. Previous research has also attested to the superiority of virtual experiences with non-immersive VR over indirect experiences afforded by pictures, videos, and brochures in terms of consumers' product knowledge and brand attitude but not purchase intent (Fiore *et al.*, 2005; Li *et al.*, 2002). It thus seems that fully immersive VR cannot sufficiently induce purchase intent directly. In a similar case, Griffin *et al.* (2017) compared VR to traditional media and found only marginal differences for intention to visit the destination but significant differences for intention to recommend the VR experience and the destination.

Third, our experiment revealed the higher perceptions of women over men in most of the variables under study, save interactivity and purchase intent. The non-significant results were not surprising, either, for previous studies on mediated environments have shown a range of results regarding those variables (Felnhofer *et al.*, 2012; Grassini and Laumann, 2020). In the case of interactivity, Nicovich *et al.* (2005) observed higher levels of presence when participants interacted with and controlled a flight simulator in an interactive condition, and the women in their sample seemed to more easily experience presence than men when merely watching the environment in the non-interactive condition. Thus, it seems that interactivity does not improve the experience of women in mediated environments, which could explain why women did not have higher perceptions of interactivity than men in our study.

5.2 Theoretical implications

First among the theoretical implications of our results, most of the relationships proposed in the structural model were accepted, which implies the appropriateness of applying theory on consumer learning to explain mediated experiences in the context of consumers' decision-making about cruise vacations, a context in which the theory had never before been applied. Along those lines, our results extend the theory to include mediated experiences using immersive VR and confirm presence as a key construct in the model. To the best of our knowledge, no past studies have integrated both the antecedents and consequences of presence in the same model for the context of tourism.

Second, we have broadened the theoretical approach by adding the variable of enjoyment as a consequence of presence. In our study, the impact of presence on enjoyment was the greatest of all proposed consequences. Although the effects found between enjoyment and both product knowledge and purchase intent were not significant, our other results confirm the positive impact of enjoyment on brand attitude. That result aligns with the findings of Tussyadiah *et al.* (2018), who found that enjoyment during a VR experience positively affects attitude toward the destination and, in turn, the intention to visit the destination. Although research conducted in ICT contexts has identified presence's significant effect on enjoyment, few studies in tourism have tested that relationship (Yung *et al.*, 2021). The impact of enjoyment on brand attitude is relevant, however, likely due to the latter's emotional component (Fiore and Kim, 2007). Consequently, we advise including enjoyment in future research analyzing the consequences of presence to capture the emotional aspects of the mediated experience.

Third, our results confirm that VR enhances tourist's gathering of pre-purchase information more than the standard website, which again underscores the persuasiveness of VR. In particular, the results reveal that VR visualization achieved higher levels of media richness, interactivity, presence, enjoyment, product knowledge, and brand attitude, albeit not purchase intent, than website visualization. The most pronounced differences according to the visualization format emerged in the self-location dimension of presence, which corroborates findings in other contexts suggesting that the feeling of being located in a mediated environment is usually pivotal to explaining VR's effectiveness relative to traditional media (Gutiérrez *et al.*, 2008; Yung *et al.*, 2021).

Fourth, our study has revealed the higher perceptions of women versus men in mediated experiences. Except for interactivity and purchase intent, women had higher perceptions of all variables—media richness, presence, enjoyment, product knowledge, and brand attitude—and those results align with published findings (Dirin *et al*., 2019; Mousas *et al.*, 2018; Narciso *et al*., 2019). Considering both the effect of visualization format and gender, we can thus conclude that VR improves the feeling of presence, enjoyment, and tourists' learning, and that those effects are more pronounced for women, except for the effect on purchase intent.

5.3 Practical implications

During situations such as the current COVID-19 pandemic, technologies that facilitate social distancing without requiring human involvement have been appreciated by tourists (Morosan and DeFranco, 2021). Because VR enhances tourists' gathering of pre-purchase information more than websites, consumers who possess VR devices and are sensitive to social distancing are likely to enjoy the VR experience and buy a cruise vacation without ever visiting a physical travel agency.

Incorporating VR in the sales process may be a valuable tool for travel agencies, destination marketing organizations, and cruise companies. In fact, some authors have conceptualized the benefits of

incorporating VR in spaces such as travel agencies and tourism information centers (Flavián *et al.*, 2019, 2021; Hollebeek and Rather, 2019). Increasing presence while designing communication campaigns in virtually mediated experiences can boost enjoyment along with product knowledge, brand attitude, and purchase intent. Such presence can be fostered by increasing the medium's richness and interactivity—for instance, by increasing the resolution of pictures and the pace of control over the website. Increasing enjoyment by adding entertaining, engaging features in those communication campaigns can increase brand attitude as well.

According to the differences found for gender in our study, travel agencies and cruise companies should develop marketing segmentation strategies, for VR was shown to improve consumer learning but more for women than for men. Thus, VR seems especially useful for targeting women, who tend to dominate the information-gathering stage of planning family vacations (Rojas-de-Gracia *et al.*, 2019). Tourism agents and advertisers could also create VR marketing campaigns specifically tailored to women's experience, for they form the market segment that usually gathers information during vacation planning and are more impressed than men by the medium. As Singh and Gupta (2021) have shown, women travelers indeed comprise a booming segment of the travel market, and their particular needs and motivations require further research. Offline, tourist agencies could reserve specific spaces with VR equipment at the point of sale, where potential travelers could become immersed in a realistic preview of tourism products (e.g., cruise vacations, destinations, and hotels) to learn about them during the pre-purchase stage. By extension, the same VR content made available at the point of sale could be uploaded to the Internet, thereby allowing consumers to experience the content with their VR devices at home.

5.4 Limitations and future research

Some limitations of our study should be addressed for their value in generating future lines of research. For one, future studies should replicate the structural model that we analyzed but with larger samples to verify the results as well as apply other methods based on covariance (e.g., structural equation modeling). Additional analyses could also be performed to capture the emotional aspects involved in mediated experiences. For another, regarding our experiment, further research could also include other user characteristics that have hardly received attention, including previous experience with the technology, age, and level of education. Although we focused on gender and media form, media content is another characteristic that affects the sense of presence in mediated experiences (Lessiter *et al.*, 2001). Last, we uses questionnaires to collect information, whereas future research could use objective measurements derived from neuromarketing to confirm the results.

Statement of competing interests
The authors have no competing interest to declare.

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