Integrating virtual reality devices into the body: effects of technological embodiment on customer engagement and behavioral intentions toward the destination

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Acknowledgements

This work was supported by the Spanish Ministry of Economy and Competitiveness (ECO2016-76768-R); the European Social Fund and the Government of Aragon (group "METODO" S20_17R and pre-doctoral grant 2016-2020 BOA IIU/1/2017).

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Virtual reality devices create a high integration of technologies with human senses. However, few studies analyze how embodied technologies affect customer pre-experiences with a destination. Results from a lab experiment show that compared to desktop PC and mobile phones, VR head-mounted displays generate more immersive experiences, higher sensory stimulation, more engagement, and higher behavioral intentions toward the destination. Immersion and sensory stimulation mediate the effects of technological embodiment on engagement and behavioral intentions. Furthermore, active (versus passive) tourism content strengthens these effects. Our results stress the role of technological embodiment to generate effective pre-experiences with potential tourists' destinations.

Keywords: virtual reality; destination marketing; tourist pre-experiences; technological embodiment; immersion; sensory stimulation; engagement; behavioral intentions; active tourism; SOR model.

1. Introduction

The development of new technologies characterized by high degrees of portability and embodiment has brought virtual reality (VR) to a new level. Recent reports show that users are increasingly adopting this technology: in the third quarter of 2017, sales of VR HMD (Head-Mounted Displays) passed the 1 million for the first time (Canalys, 2017) and it seems that the growth of the VR HMD market is set to continue (Canalys, 2018). The launch of standalone VR devices (e.g. Oculus GO, HTC Vive Focus), together with the price decreases, may boost adoption of these technologies (Canalys, 2017). However, recent reports note a recent decline in the sales of VR devices (CCSInsight, 2018; IDC, 2018), showing that the growth in the adoption of VR is slower and more irregular than expected. Therefore, understanding how users interact with these technologies to support, empower, or create new experiences represents a challenge that must be addressed by researchers and practitioners (Flavián, Ibáñez-Sánchez, & Orús, 2018).

The particular features of tourism (e.g. service-intense industry, services that cannot be tested in advance; Guttentag, 2010; Neuhofer, Buhalis, & Ladkin, 2014) make it an ideal industry in which to develop VR technologies and analyze their impact. In fact, users have shown high interest in the use of VR devices in the travel and adventure field (Greenlight, 2016). Users perceive that VR adds value to their travel decision-making processes, so they are willing to use this technology at a travel agency as well as to book vacations based on in-store VR experiences (YouGov, 2016).

Marketers are striving to find innovative ways to attract potential customers to their destinations (Pike & Page, 2014). The use of VR devices can help tourism managers to design and deliver optimal customer experiences (Berg & Vance, 2016). More specifically, embodied VR devices have great potential to affect tourists' behaviors, especially in the pre-purchase stage of the customer journey (Guttentag, 2010; Lemon & Verhoef, 2016; Marasco, Buonincontri, van Niekerk, Orlowski, & Okumus, 2018;

Tussyadiah, Wang, Jung, & tom Dieck, 2018). Embodied VR devices can be said to be in direct contact with the human senses and can mediate the potential customers' experiences within a virtual environment, giving them the ability to explore virtually, and thereby assess, specific destinations (which cannot be pre-tested). Consequently, the consumer can make more confident decisions in relation to visiting that destination (Marasco et al., 2017).

Most studies about the implementation of VR technology in the tourism field focus on its antecedents (e.g. Disztinger, Schlögl & Groth, 2017; Gibson & O'Rawe, 2017), its influence on decision-making process (e.g. Marasco, et al., 2018; Tussyadiah et al., 2018) or the benefits of its application (e.g. Barnes, 2016; Guttentag, 2010). However, the influence of technological embodiment, which is one of the main features of VR technologies (Tussyadiah, Jung, & tom Dieck, 2017), has not been empirically analyzed. Technological embodiment occurs in situations in which the technological device mediates users' experiences, intertwining with their bodies and supporting them to perform sensorial and bodily functions (theory of technological mediation; Ihde, 1990). Technological embodiment allows users to extend their bodies to perceive, interpret and interact with the environment (Tussyadiah, Jung, et al., 2017). Following the EPI Cube proposed by Flavián et al. (2018), technological embodiment ranges from the lowest level of integration (e.g., stationary desktop computers) to a full integration with the senses (e.g., smart contact lenses). In addition, few empirical studies investigate VR applications in tourism marketing, since most studies have been conducted with traditional virtual worlds (e.g. Second Life; Tussyadiah, Wang, & Jia, 2017).

This research analyzes how degree of technological embodiment (high: VR HMD, medium: mobile phone, low: desktop PC) affects the customer pre-experience with a destination. Based on the Stimulus-Organism-Response (S-O-R) paradigm (Donovan &

Rossiter, 1982; Mehrabian & Rusell, 1974), we propose that level of embodiment (stimulus) affects users' perceptions of immersion and sensory stimulation (organism), which ultimately determine their experience in terms of engagement and behavioral intentions toward a destination (response). By better understanding the processes through which technological embodiment enhances customer experience, tourism managers will be able to create superior and more memorable experiences by offering their customers high value propositions, especially in the pre-experience stage of their customer journey.

2. Theoretical background

The Stimulus-Organism-Response (S-O-R) paradigm is rooted in classic Stimulus-Response theory (classical conditioning; Pavlov, 1902), which posits that, after being shown a specific stimulus, subjects carry out a paired response. The classic conditioning model was extended by Mehrabian and Rusell (1974) and Donovan and Rossiter (1992) to the S-O-R paradigm. Stimuli are the specific factors that arouse the organismic processes of the individual (Eroglu, Machleit, & Davis, 2001). Through the processing of these stimuli, internal processes are generated (organism). Eventually, this finally leads to responses, such as approach or avoidance behaviors (Donovan & Rossiter, 1982). Thus, the S-O-R model proposes that stimuli cause organismic reactions, which lead to the performance (or not, as the case may be) of certain actions. The organism mediates the influence of a particular stimulus on the response. The S-O-R model has previously been used in online shopping environments (e.g. Eroglu et al., 2001; Ettis, 2017; Mummalaneni, 2005). In virtual environments, stimuli are the visual and auditory cues presented to the shopper, who processes these stimuli (organism) and, consequently, responds by buying (or not) a particular product (Eroglu et al., 2001).

2.1. Stimulus: technological embodiment

Recent technological developments have altered the processes of human-computer mediation. Theory of technological mediation (Ihde, 1990) describes embodiment as a situation in which a technological device mediates the users' experiences and, consequently, the technology becomes an extension of their bodies and helps them to interpret, perceive and interact with their immediate environment. Maximum levels of technological embodiment lead to human-technology symbiosis (Tussyadiah, 2014). As stated by Witmer and Singer (1998), technological devices are becoming more intertwined with human bodies, assisting and mediating the users' experiences (Tussyadiah, Jung, et al., 2017).

The National Research Council (2012) proposes different levels of technological embodiment, ranging from minimum or no embodiment (e.g. desktop PCs) to devices that are fully-integrated in the human body (e.g. microchips or smart contact lenses). Intermediate levels include portable external devices (e.g. mobile phones). Between portable external and fully-integrated devices, we find advanced tools, commonly described as wearables (e.g. VR HMD) (Tussyadiah, Jung, et al., 2017). In addition, the EPI cube (Flavián et al., 2018) notes that VR HMD are highly embodied technologies, while mobile phones and desktop PCs are in medium and low levels of embodiment, respectively. Recently developed wearable technologies have been compared to embodied technologies (Tussyadiah, 2014; Tussyadiah, Jung, et al., 2017), since they reinforce the user´s sense of integration between the body and the technology. Therefore, devices with different levels of technological embodiment are the stimuli that are proposed to affect the organism components (immersion and sensory stimulation) and responses (engagement and behavioral intentions).

2.2. Organism: immersion and sensory stimulation

2.2.1. Immersion

Immersion is an individual experience, defined as the "psychological state characterized by perceiving oneself to be enveloped by, included in, and interacting with an environment that provides a continuous stream of stimuli and experiences" (Witmer & Singer, 1998, p. 227). This is related to the concept of "mental immersion", defined by Sherman and Craig (2003) as the state of being deeply involved in an experience with the suspension of disbelief. These authors state that physical immersion, in which the technological stimulus creates the sensation that the body has entered into the virtual environment, may have an important effect on mental immersion.

Cutting-edge technologies characterized by a high degree of immersion can generate experiences in which users feel as if they are actually part of the virtual environment (Tussyadiah et al., 2018). Furthermore, as the efficacy of traditional media is decreasing (Fransen, Verlegh, Kirmani, & Smit, 2015), marketers are continually on the lookout for more effective formats. Embodied VR technologies can enhance the communication of intangible experiences (i.e. tourism), resulting in an improvement of the destination image in the minds of potential visitors (Griffin et al., 2017). Embodied devices provide customers with a higher sense of closeness between the virtual environment and their senses, thus creating more immersive experiences than portable or external technologies (Biocca, 1997; Flavián et al., 2018). In addition, high embodied technologies create a greater sense of immersion in the virtual environment by matching their users' body movements with the information displayed (Witmer & Singer, 1998). Hence:

H_1: High vs. medium vs. low levels of technological embodiment have a positive effect on users' perceived immersion.

2.2.2. Sensory stimulation

According to Krishna (2012), sensory marketing aims to engage the customers' senses, resulting in changes in their perceptions, judgments and subsequent behaviors. Consumers experience their surroundings through their senses, so sensory information and the related subjective experiences are crucial in human action and cognition (Krishna & Schwarz, 2014). Experiential products (such as tourism) need to provide vicarious experiences with sensory information to create an attractive destination (Hyun & O'Keefe, 2012).

VR technologies generate virtual environments where users obtain information directly through the stimulation of their senses, which provides them with a realistic representation of the simulated environment (Slater & Usoh, 1993). Sensorial richness is regarded as one of the variables that influences virtual experiences (Steuer, 1992), and VR offers elements that generate sensory stimulation (Cheong, 1995).

Sight is the sense most often stimulated by HMD devices. Audio is also important (Jung, tom Dieck, Moorhouse, & tom Dieck, 2017) and is widely used in realistic virtual environments (Gutiérrez, Vexo, & Thalmann, 2008). For tourism, these two senses are regarded as paramount (Guttentag, 2010). In addition, haptic devices (e.g. gloves or haptic suits) can trigger tactile sensations. Finally, recent advances have been made regarding the olfactory and gustatory senses (Gutiérrez et al., 2008). Thus, it has been demonstrated that more embodied technologies have the potential to create extensive multi-sensory experiences, which might result in better consumer responses.

Specifically, high embodied technologies use effectors (e.g. HMD, haptic devices), which stimulate the receptors of the perceptual human senses (Latta & Oberg, 1994). Therefore, devices with higher levels of technological embodiment generate stronger sensorial stimuli, resulting in more stimulating sensorial experiences (Biocca, 1997; Flavián et al., 2018 Tussyadiah, 2014), than non-embodied devices. Thus:

H_2: High vs. medium vs. low levels of technological embodiment have a positive effect on users' sensory stimulation.

2.3. Response: engagement and behavioral intentions

2.3.1. Engagement

User engagement is defined as the quality of the experience characterized by the depth of the users' cognitive, temporal, affective and behavioral investment when they are interacting in the digital environment (O'Brien, 2016). The underlying processes of user engagement in virtual environments are receiving great attention from both researchers and managers (O'Brien, 2016).

For tourism marketing, providing users with VR experiences (as they resemble direct experiences to a great extent) is expected to be more effective than giving them indirect experiences, favoring engagement with the real destination (Hyun & O'Keefe, 2012). High embodied devices have great potential to engage tourists (Tussyadiah, Jung, et al., 2017). Previous research has shown that advertising destinations using embodied VR devices is more engaging than with other, traditional formats (Griffin et al., 2017). In the same way, watching videos through highly embodied devices (e.g. VR HMD) generates more engagement than watching them on a flat screen (Nielsen, 2016). VR experiences generate customer engagement by creating emotional connections with the destination depicted (Barnes, 2016). Therefore, we propose that devices with high levels of technological embodiment will generate more engagement than devices with medium and low levels of embodiment:

H_3: High vs. medium vs. low levels of technological embodiment have a positive effect on users' engagement.

2.3.2. Behavioral intentions

Intentions are the main antecedents of actual customer behaviors (Ajzen, 1991). Intentions reflect the eagerness of users to carry out particular behaviors. Previous research has shown that there is a relationship between intentions and actual behaviors (Casaló, Flavián, & Ibáñez-Sánchez, 2017; Venkatesh & Davis, 2000).

Previous studies also show that VR technologies can provide "try-before-you-buy" experiences, which create a destination image in the mind of potential visitors, leading to positive behavioral intentions (Marasco et al., 2018; Tussyadiah et al., 2018). In fact, the study of the marketing opportunities that VR technologies offer, in terms of influence on potential visitors' decisions whether or not to visit a destination, is a growing research topic (Griffin et al., 2017; Marasco et al., 2018).

The impact of high embodied technologies on consumer behavior has been highlighted by previous literature. Kim, Lee and Jung (2019) stress the potential of VR to enhance the behavioral intentions toward visiting a destination. Griffin et al. (2017) state that embodied devices, in comparison to less embodied technologies, generate greater willingness to seek out further information, and to share it, about a destination. Tussyadiah et al. (2018) also reveal the persuasive power of embodied devices (VR) in tourism marketing. Therefore, we propose that devices with high levels of technological embodiment will have a positive impact on behavioral intentions. Thus:

H_4: High vs. medium vs. low levels of technological embodiment have a positive effect on users' behavioral intentions toward the destination.

2.3.3. Mediation effects

Following the S-O-R framework (Donovan & Rossiter, 1982; Mehrabian & Rusell, 1974), we propose that immersion and sensory stimulation are the organismic components that may mediate the relationship between the stimulus (devices different levels of technological embodiment) and the responses (engagement and behavioral intentions). On the one hand, high embodied technologies play a key role in providing immersive experiences that, as a result, generate a perception of engagement while users are in the virtual environment (Jennet et al., 2008; Sherman & Craig, 2003). On the other hand, one of the main advantages of embodied technologies for tourism marketing is that they provide potential tourists with sensory cues, which is crucial for the industry (Barnes, 2016; Guttentag, 2010). As a consequence, a sense of engagement in the virtual experience can be generated (Barnes, 2016). Therefore, both organismic components (immersion and sensory stimulation) may mediate the influence of devices with different levels of technological embodiment on users' engagement:

H_5: The levels of (a) immersion and (b) sensory stimulation mediate the effect of high vs. medium vs. low levels of technological embodiment on users' engagement.

Taking into account the particular features of the tourism industry (service domain and intangibility; Casaló, Flavián, & Guinalíu, 2010; Hyun & O'Keefer, 2012), providing potential visitors with a realistic "try-before-you-buy" experience can influence travel decision-making (Jang, 2005; Tussyadiah, Wang, & Jia, 2016). In this way, immersive technologies help potential visitors virtually to experience the actual destination before going there (Marasco et al., 2018; Tussyadiah et al., 2018). Previous research shows that the immersive capacity of VR devices can have a positive impact on subsequent behavior (Jung et al., 2017). Thus, high levels of immersion generated by embodied technologies may lead to favorable behavioral intentions toward a destination. In a similar vein, sensory cues can significantly influence the consumer's intention to visit a destination (Ghost & Sharkar, 2016). Potential tourists can better evaluate and make better travel decisions if they are provided with useful and relevant information (Mendes-Filho, Mills, Tan, & Milne, 2017). Direct experiences can be simulated through the sensory power of high embodied technologies (VR), which will result in more positive behaviors (Huang, Backman, Backman, & Chang, 2016). Therefore:

H_6: The levels of (a) immersion and (b) sensory stimulation mediate the effect of high vs. medium vs. low levels of technological embodiment on users' behavioral intentions toward the destination.

2.4. Moderating effect: active/passive tourism

Previous studies reveal several motivations for tourism travel, such as leisure, escapism, novelty and pleasure seeking (Guttentag, 2010; Kim, Chua, Lee, Boo, & Han, 2016; Kim & Prideaux, 2005). Tourists perform different activities during their stays to meet their own particular needs. In this sense, tourism activities can be classified according to the degree of physical energy that is expended (Pizam & Fleischer, 2005). Specifically, active (or dynamic) tourism encompasses activities in which tourists expend significant physical energy; these may include fast-moving, outdoor activities (vigorous sports, nature or adventure; Vohnout et al., 2014). Activities such as rafting or hiking can be considered as active tourism. On the other hand, passive (or static) tourism includes activities where the tourist does not expend significant amounts of physical energy. These activities are slow-paced, well planned and organized in advance, so they involve no risk. City based activities e.g. shopping, attending the opera, ballet and theater, are often regarded as passive tourism.

According to the cognitive fit theory (Vessey, 1991), when users are presented with a particular task, the correspondence between the task and the format in which the relevant information is displayed results in superior task performance. Similarly, resource-matching theory (Peracchio & Meyers-Levy, 1997) suggests that the persuasiveness of a particular item of information is higher when the resources allocated to process it match that required to perform the related task. Therefore, the fit between the technology used to visualize a particular message and the features of the content displayed in the message is critical (task-technology fit; Goodhue & Thompson, 1995), especially taking into account that tourism services cannot be pre-tested by the consumers (Guttentag, 2010).

As technological embodiment is related to the extent that a device is integrated into the body, highly embodied devices (i.e., VR HMD; Flavián et al., 2018) will allow users to perceive more naturally the fast-paced movements, greater dynamism and energy that featured active tourism activities. A greater correspondence between the active tourism video visualized and the technological device used strengthens users' perceptions (Goodhue & Thompson, 1995). However, for passive tourism activities videos (compared to active tourism) the role of embodiment is not substantial due to its main characteristics (e.g. slow-paced movements, less energetic activities). Additionally, embodied VR devices turn potential tourists into active participants since they can freely and naturally explore the virtual environment (Cho, Wang, & Fesenmainer, 2002), what reinforces their role in active tourism videos. Therefore, given the characteristics of active tourism, embodied devices (VR HMD) help to create a close match between users' actual movements and the ones in the virtual environment (Slater, 2009), what help potential travelers to better explore virtually the destination and strengthening their perceptions. Therefore:

H_7: The type of tourism (active/passive) moderates the effects of high vs. medium vs. low levels of technological embodiment on (a) immersion, (b) sensory stimulation, (c) engagement and (d) behavioral intentions; the effects of technological embodiment will be stronger for active tourism than for passive tourism.

Figure 1 shows the research model and related hypotheses.

INSERT FIGURE 1 ABOUT HERE

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3. Methodology

3.1. Participants, procedure and measures

The data to test the hypotheses were collected from a lab experiment. The sample consisted of 202 participants, who took part in a 3 (technological embodiment: low vs medium vs high) x 2 (type of tourism: passive vs active) between-subjects factorial design. The respondents were 59.4% female and aged, on average, 22.10 years. We focused on this age range since members of the youngest generations are highly interested in VR technologies (Commscope, 2017; Greenlight, 2015).

The context of the experiment was a 360-degree tourism-related video as a pre-experience of a potential destination. First, the participants were gathered in one room and given a brief introduction about the study. Specifically, they were told that they were going to have a virtual pre-experience with a destination and they had to answers related to it. At this point, the participants received a brochure with several pages containing the questionnaires. We used random procedures (different colored stickers) to hand out the brochures. In the first page, participants answered a series of control questions. Specifically, they indicated their previous touristic experience with different destinations (including the ones that were going to be displayed in the subsequent video) with four possible options: (1) “I have not visited the destination, and I do not plan to”; (2) “I have not visited the destination, but I would like to”; (3) “I have visited the destination, and I would not visit it again”; (4) “I have visited the destination, and I would not mind to visit it again”. After that, we asked the participants about their preferences (from 1 = “I do not like it at all”, to 7 = “I like it very much”) about different types of tourism (city, nature, adventure sports, sun and beach). In addition, the participants indicated their degree of experience with 360-degree videos with different devices (desktop PC, laptop, tablet, mobile phone, VR HMD), on a 7-point scale (from 1 = “I have never used this device”, to 7 = “I am very used to use this device”). Finally, we asked the participants about their degree of technological innovativeness (six 7-point Likert items adapted from Bruner & Kumar, 2007; Thakur, Angriawan, & Summey, 2016; Appendix).

Second, participants were directed to different experimental rooms, according to their assignment to the experimental condition (colored sticker). Each color corresponded to the visualization of a 360-degree video of a destination with a device with three levels of embodiment: low (desktop PCs), medium (mobile phones) and high (VR HMD). Participants entered individually into the room and, after some instructions they watched the video with the corresponding device. Regarding the type of tourism, participants in the passive tourism condition watched a video of a gondola ride in Venice. The video showed a quiet ride along the canals of the city in a sunny day; the viewer was placed on the gondola, plowed through the calm waters of the canals in a slow-paced way. In the active tourism video, participants watched a video of a whitewater rafting in the Grand Canyon. In this video, the viewer was placed on a boat on a sunny day in the middle of nature; in this case, they sailed down through the rapids of a river, so that a great movement was generated in a fast-moving way. The original videos were modified to keep the duration and sound quality constant.

After visualizing the video, the participants completed the questionnaire (Appendix). We adapted scales previously validated in the literature for immersion (Fornerino, Helme-Guizon, & Gotteland, 2008), sensory stimulation (Witmer & Singer, 1998), engagement (O’Brien, Cairns, & Hall, 2018; O’Brien & Toms, 2010) and behavioral intentions toward the destination (Bigné, Sánchez, & Sánchez, 2001; Huang, Backman, Backman, & Moore, 2013). In relation to manipulation checks, we developed four items to measure degree of technological embodiment, as we were not able to find any specific measure in previous studies (Appendix). All the items used seven-point

Likert scales. In addition, the participants indicated their perceptions as to whether the depicted destination had passive (1) or active (7) tourism and whether they would categorize it as having “city” or “sports/nature” tourism.

4. Results

Before analyzing the data, the first control question allowed us to screen out those participants who had already visited the target destination (Venice or the Grand Canyon) and would not visit it again. The resulting pre-experience and behavioral intentions of these participants might remain unaltered regardless of the experimental treatment, adding noise to the analysis. Thus, the final sample consisted of 196 participants (60.2% female; mean age = 22.10). Cell sizes ranged from 30 to 36 participants.

4.1. Scale validation

To validate the measurement model we performed a confirmatory factor analysis with SmartPLS 3 (Ringle, Wende, & Becker, 2015). Results confirmed that all the loadings from the items were higher than the recommended value of 0.7 (Henseler, Ringle, & Sinkovics, 2009). Additionally, the values of Cronbach Alphas were superior to 0.7 (Bagozzi & Yin, 1988) and composite reliabilities were higher than the recommended value of 0.65 (Steenkamp & Geyskens, 2006), proving their internal consistency. Convergent validity was confirmed since the values of the average variance extracted (AVE) were superior to the benchmark of 0.5 (Fornell & Larcker, 1981). Finally, the value of the square root of the AVE were higher than the correlations among the constructs (Fornell & Larcker, 1981) and the values of the HTMT ratio (Heterotrait-Monotrait ratio; Henseler, Ringle, & Sarstedt, 2015) were lower than 0.90 (Gold, Malhora, & Segars, 2001), establishing the discriminant validity of the measures.

4.2. Manipulation checks

To check the manipulation of technological embodiment, we carried out a one-way ANOVA with device type as the independent variable with SPSS v22. As expected, technological embodiment was higher in the case of VR HMD ($M = 5.58$, $SD = 1.55$) than with mobile phones ($M = 4.30$, $SD = 1.12$) and desktop PCs ($M = 2.89$, $SD = 1.01$), and these differences were significant ($F_{(2,195)} = 104.014$, $p < 0.001$). The post-hoc Tukey tests revealed significant differences between desktops and mobile phones ($p = 0.000$), desktops and VR HMD ($p = 0.000$) and mobile phones and VR HMD ($p = 0.000$). In addition, the Grand Canyon video was perceived as significantly more active ($M = 5.32$; $SD = 1.68$) than the Venice video ($M = 4.38$, $SD = 1.49$; $t_{(194)} = 4.126$, $p < 0.001$). Also, participants correctly classified the Venice video as city tourism and the Grand Canyon video as nature/sports tourism ($\chi^2_{(2)} = 196.000$, $p < 0.001$).[1]

4.3. Direct and moderation effects

The descriptive statistics per each experimental cell and treatment are shown in Table 1. We carried out a multivariate analysis of variance, which is appropriate since the correlations between the dependent variables were significant (*r*s > 0.281; Hair, Anderson, Tatahm, & Black, 1998). We included the participants' previous experience in the destination (1 = yes, 0 = no), preference for the type of tourism displayed in their condition (city or adventure sports), their previous experience with 360-degree videos in the device they used in their condition (desktop PC, mobile phone, or VR HMD), and their degree of technological innovativeness as covariates. The MANCOVA revealed a

[1] The same analyses were carried out including the control variables (previous experience with the destination, preference for the type of tourism, previous experience with the technology, degree of technological innovativeness) as covariates. The results of the ANCOVAs replicated those of the ANOVAs. None of the control variables had a significant impact on the perceptions of technological embodiment (*p*s > 0.182) and on the perceptions of active/passive tourism (*p*s > 0.406).

significant multivariate effect of the type of device (*Wilk's lambda* = 0.469, $F_{(8, 374)}$ = 21.024, $p < 0.001$; *partial* η^2 = 0.315; *power* = 1.000). Type of tourism did not have a significant multivariate effect ($p = 0.934$). However, the interaction term was significant at the multivariate level (*Wilk's lambda* = 0.895, $F_{(8, 374)}$ = 2.597, $p < 0.05$; *partial* η^2 = 0.054; *power* = 0.921). Regarding the control variables, the MANCOVA showed a significant multivariate effect of the participants' previous experience in the destination (*Wilk's lambda* = 0.945, $F_{(4, 183)}$ = 2.679, $p < 0.05$; *partial* η^2 = 0.055; *power* = 0.737). Their preference for the type of tourism ($p = 0.741$), their previous experience with the technology ($p = 0.074$) and their degree of technological innovativeness ($p = 0.524$) had no significant effects.

INSERT TABLE 1 ABOUT HERE

Overall, we observed gradual increases in all the dependent variables as the degree of technological embodiment increases (Table 1). The results for the univariate effects are shown in Table 2. Specifically, the type of device was found to positively affect the levels of immersion and sensory stimulation. The effects were significant and strong. The post-hoc Tukey test indicated that both variables were higher for participants in the VR condition than those in the mobile phone condition (Table 1; *p*s < 0.001) and those in the desktop PC condition (Table 1; *p*s < 0.001). The differences between mobile phone and desktop PC were also significant (Table 1; *p*s < 0.001). Thus, hypotheses H1 and H2 were supported. None of the covariates had a significant influence on immersion or sensory stimulation (Table 2).

INSERT TABLE 2 ABOUT HERE

Regarding the influence of embodiment on engagement, we found a significant strong effect (Table 2). The high level of technological embodiment (VR HMD) was found to positively affect the participants' engagement (Table 1). The post-hoc Tukey test indicated that all differences between conditions were significant (all *p*s < 0.001), thus supporting H3. The effect of the type of device on behavioral intentions was also significant, although the effect size was medium (Table 2); however, the difference between mobile phones and VR HMD was not significant (Table 1; $p = 0.751$). Therefore, H4 was partly supported. The control variables did not affect engagement and behavioral intentions, except for a small, significant impact of the previous experience in the destination on behavioral intentions (Table 2). Specifically, behavioral intentions were higher for participants who had not been in the destination previously ($n = 154$; $M = 4.91$, $sd = 1.449$) than for those who had already been in the destination ($n = 42$; $M = 4.44$, $sd = 1.715$).

Type of tourism had no direct effects on the dependent variables (Table 1 and Table 2). However, significant interaction effects were found for immersion, sensory stimulation and engagement (Table 2). The effect sizes were medium for immersion and sensory stimulation, and small for engagement. Figure 2 shows these interaction effects. Specifically, we observed that the effects of high embodied technologies on immersion (Figure 2a), sensory stimulation (Figure 2b) and engagement (Figure 2c) were stronger for the active tourism video than for the passive tourism video. The interaction between technological embodiment and tourism type on behavioral intentions was not significant ($p = 0.400$). Altogether, the results support H7a, H7b and H7c, yet H7d must be rejected.

INSERT FIGURE 2 ABOUT HERE

4.4. Mediation effects

We used the PROCESS macro v3.1 for SPSS (Hayes, 2018; http://www.processmacro.org) to test the mediating role of the organismic components (immersion and sensory stimulation) in the relationship between the stimulus (technological device) and the participants' responses (engagement and behavioral intentions). The PROCESS macro is a simple, user-friendly modeling system that uses OLS regression procedures (Hayes. 2018). Similar to other techniques which rely on ML procedures, such as Structural Equation Modeling (SEM), the PROCESS macro estimates indirect effects and does not require separate tests to assess the significance of the mediation effect. However, unlike SEM, PROCESS can be used with smaller samples with irregular sampling distributions, given that it uses bootstrapping methods to estimate indirect effects (Hayes, Montoya, & Rockwood, 2017; Hayes, 2018). By using bootstrap confidence intervals, the inferences are likely to be more accurate and the test has higher power than when using ordinary methods (Bernardo, Tan-Mansukhani, & Daganzo, 2018; Hayes 2018). Hayes et al. (2017) argue that both methods are equally valid for mediation models, and produce similar results for observed variables (as is our case, given that the scales are formed by the average of the items). In addition, PROCESS can be particularly useful given the particularities of our model: two parallel mediators and one multicategorical independent variable with three levels. PROCESS allows researchers to analyze direct, indirect, and total effects simultaneously with the total sample and does not require subgroup analysis (Hayes, 2018).

We ran two separate models for each response variable (model 4 with parallel mediators). As the independent variable was an ordinal multicategorical variable with three levels, sequential coding was used (Hayes, 2018). Thus, two dummy variables (X1: 0 = Desktop PC, 1 = mobile phone and VR HMD; X2: 1 = VR HMD, 0 = otherwise) were included in each model. The participants' previous experience in the destination and with the technology, their preference for the type of tourism displayed in the video, and their degree of technological innovativeness were also included as covariates.

The results of the mediation model on engagement are displayed in Table 3. The results of the effects of the device on immersion and sensory stimulation replicated those found in the MANCOVA. When the organismic variables were included in the model, the direct effects of technological embodiment became non-significant. Both immersion and sensory stimulation had significant effects on engagement. The bootstrap results for the indirect effects revealed mediation for both organismic variables, given that the zero value was not included in the 95% confidence intervals (Table 3). Therefore, H5a and H5b were supported. Regarding the control variables, we found that participants who had already been in the destination reported higher levels of engagement. However, the total effect of this variable was not significant, and no other effects were found (Table 3).

INSERT TABLE 3 ABOUT HERE

The same analysis was carried out for behavioral intentions. Taking into account that the effects of the independent variable (type of device) on the mediators (immersion and sensory stimulation) are similar to those calculated in the previous model (Table 3), Table 4 displays the results of the regression on behavioral intentions. In this case, the mediation model followed a similar pattern, yet with some remarkable differences. The direct effect of the device on behavioral intentions disappeared when the mediators were included in the regression. However, immersion had no significant effect on behavioral intentions; only sensory stimulation had a significant influence (Table 4). The significance of the indirect effects revealed that sensory stimulation mediated the effect of technological embodiment (low versus medium + high) on behavioral intentions. Support for H6b is found; H6a must be rejected. The participants' previous experience with the destination and the technology, their preference for the type of tourism and their degree of technological innovativeness did not have a direct impact on behavioral intentions when the mediators were included in the model (Table 4). In the total effects model, the results replicated those found in the MANCOVA (negative of previous experience in the destination on behavioral intentions). Nevertheless, the explanatory power of the model was low, suggesting than the mediator (sensory stimulation) has a more powerful effect on behavioral intentions than the type of device used in the pre-experience with the destination.

INSERT TABLE 4 ABOUT HERE

5. Discussion and implications

VR technologies can allow potential tourists to have realistic "try-before-you-buy" experiences that help them make better travel decisions (Jang, 2005; Tussyadiah et al., 2016). Specifically, embodied VR devices are in close contact with the human senses, mediate users' experiences, create immersive and sensory-stimulating experiences that improve tourists' information search processes and, thus, help them make final decisions (Huang et al., 2016). This research uses the S-O-R model to provide a better understanding of the impact of this particular feature of VR devices on tourists' responses.

First, in line with previous notions, the results of the analysis show that technologies with high levels of embodiment (VR HMD) produced higher levels of immersion and sensory stimulation than technologies with medium and low levels of embodiment (Biocca, 1997; Shin, 2017; Tussyadiah, 2014). Furthermore, embodied technologies improve user engagement with the pre-experience of the destination. This finding highlights the role of embodied VR technologies for the tourism industry in terms of engaging tourists (Griffin et al., 2017). Finally, we found partial support for the effect of technological embodiment on behavioral intentions. Although there are clear differences between VR HMD, mobile phones and desktop PCs, it appears that medium levels of technological embodiment may be enough to increase the potential tourist's behavioral intentions toward the destination. This could be due to the fact that tourists are accustomed to using their mobile phones during all the stages of their touristic experiences (Wang, Park, & Fesenmaier, 2012). In the pre-experience stage, tourists are determined to fulfill their informational needs (Lu, Gursoy, & Lu, 2016) and, therefore, they may be more concerned about the usefulness of the information for decision-making than about the integration of the technology with their senses.

Furthermore, the results reveal that the particular features of the type of tourism moderate the effects of technological embodiment. Active tourism content is better perceived with embodied VR devices (high technological embodiment) in comparison to less embodied devices. We found that active tourism videos viewed through VR HMD stimulate more immersive and sensorial experiences, and higher perceptions of engagement, than passive tourism videos viewed through VR HMD. Watching passive tourism videos through low embodied devices may be, at the very least, equally as effective as using high embodied devices. This may be explained by the matching of the users' real movements and their actions in the virtual environment, facilitated by embodied VR technologies (Slater, 2009). This leads the potential tourist to have active involvement in the virtual environment which provides him or her with a better pre-experience of the destination (Cho et al., 2002). Our results are in line with the cognitive fit theory (Vessey, 1991). However, this moderating effect was not significant for behavioral intentions. These antecedents of actual behaviors (Ajzen, 1991) can be influenced by the type of tourism, while the rest of the variables are more related to the experience itself.

Finally, the results confirm mediation in the relationship between technological embodiment and engagement through the two organismic variables, immersion and sensory stimulation. The immersive and sensory power provided by highly embodied technologies drive perceptions of engagement with the virtual destination (Barnes, 2016; Jennet et al., 2008). In addition, sensory stimulation mediates the effect of high technological embodiment on behavioral intentions. As previously stated, sensory cues can impact on the users' senses and influence their behaviors through emotions, memories, perceptions and preferences (Krishna, 2010). In tourism, this effect can be even stronger due to the particular features of the industry (Guttentag, 2010). Our findings confirm that embodied VR devices provide extensive sensory information, so their use in the tourism industry can lead to positive behavioral intentions. On the other hand, the mediating effect of immersion is not significant. This might be because immersion appeals to experiential processes and not their outcomes (Chen & Chen, 2010). Thus, sensory cues may be more important than perceptions of immersion for inducing certain behaviors.

5.1. Implications for research and practice

At the theoretical level, this research contributes to the body of knowledge about the application of VR technologies in the pre-experience stage of travelers' decision-making processes. VR devices can differ from mobile phones and stationary PCs in several dimensions. This research examines the role embodiment as one of the main differentiating features of these technologies, and proposes a measurement instrument of perceived technological embodiment. Our findings stress that technological embodiment must be taken into consideration in the study of customer experiences with VR technologies. In addition, we contribute to the call for empirical research regarding the application of VR devices in tourism marketing (Griffin et al., 2017), since most of the previous literature is mainly focused on virtual worlds (e.g. Second Life; Tussyadiah, Wang, et al., 2017).

At the managerial level, destination marketers can give tourists more effective promotional messages using embodied VR devices, integrating immersive and sensory experiences into their communication strategies to provide positive potential outcomes (Huang et al., 2016). This research sheds light on the psychological-technological processes that managers must take into account when presenting visual information to potential tourists that may affect their virtual travel experiences (Choi, Hickerson, & Lee, 2018) and increase the likelihood of them actually visiting the destination. Travel agencies can use embodied VR technologies to offer vicarious experiences that help potential visitors to make better travel decisions, especially in the case of active tourism offers. These embodied technologies can generate superior, memorable experiences that will be perceived as high value propositions by potential customers, particularly in the pre-experience stage of their customer journey. Therefore, investing in this emerging technology and the creation of attractive and suitable content may help companies to overcome the decreasing efficacy of traditional media (Fransen et al., 2015).

5.2. Limitations and future research lines

This research has several limitations that may serve as bases for future research. First, the empirical study was undertaken in artificial laboratory settings. Although this approach serves to achieve internal validity for testing purposes, it would be interesting to carry out field studies to ensure external validity and generalize the results. Second, although several features may serve to characterize these technologies, we focused on one of the main differentiating factors of VR devices (i.e., technological embodiment) to compare their effectiveness with less embodied devices. However, future research should consider additional physical variables in which these devices differ (e.g., weight, screen size). Third, the research examines the pre-experience stage of the customer journey; it would be interesting to study the effects of embodied VR devices in later stages (experience stage, post-experience stage) to obtain a global picture of the customer journey. Fourth, we focused on active/passive tourism as a moderator of the proposed relationships. However, other types of tourism (e.g. cultural, relaxing) may moderate these effects. Fifth, while our millennial sample is an interesting target group (Commscope, 2017;

Greenlight, 2015), it would be convenient to analyze market segments to enrich and generalize the results of the analysis.

Furthermore, we have taken into account several control variables (previous experience with the destination, preference for the type of tourism, previous experience with the technology, degree of technological innovativeness). However, as the newness effect of VR HMD dissipates over time (Diffusion of Innovations Theory; Rogers, 2010), users can become bored or even abandon these technologies once the initial excitement is overcome. Therefore, future studies should consider variables to reflect on the potential downsides of VR technologies (e.g. skepticism toward new technologies, novelty-seeking tendency). In addition, future studies could analyze the role that personality traits (e.g. capacity to imagine, personal involvement) play in these relationships, since previous research has shown that individual characteristics can alter the impact of VR technologies (Disztinger et al., 2017). Additionally, in the empirical study we kept the level of interactivity constant, allowing the participants to control the navigation but not manipulate it (low interactivity; Flavián et al., 2018). However, future studies should consider this variable to analyze if these devices by themselves can generate different levels of perceived interactivity in this context of study. Finally, this research offers a first step in the validation of a scale that measures effectively the level of technological embodiment perceived by users. Future studies are needed to develop and confirm scales for the more precise measurement of technological embodiment.

Disclosure statement

The authors reported no potential conflict of interest.

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Appendix

Please rate from 1 (strongly disagree) to 7 (strongly agree) the extent to which you agree with the following sentences.

Technological innovativeness *(adapted from Thakur, Angriawan, & Summey, 2016; Bruner & Kumar, 2007)*
I get a kick out of buying new high tech items before most other people know they exist.
It is cool to be the first to own high tech products.
I get a thrill out of being the first to purchase a high technology item.
Being the first to buy new technology devices is very important to me.
I want to own the newest technological products.
When I see a new technology in the store (web), I often buy it because it is new.

Please rate from 1 (strongly disagree) to 7 (strongly agree) the extent to which you agree with the following sentences in relation to your (destination) experience with (technology).

Technological embodiment			
The (technology) technology is nearly integrated into my body.			
The (technology) technology is in direct contact with my senses.			
The (technology) technology becomes part of my actions.			
The (technology) technology is an extension of my body.			
Immersion *(adapted from Fornerino et al., 2008)*			
The technology created a new world that suddenly disappeared at the end of the experience.			
During the experience with the technology, I was unaware of my real surroundings.			
The technology made me forget about the realities of the world outside.			
Sensory stimulation *(adapted from Witmer & Singer, 1998)*			
During the (technology) experience, the visual aspects of the virtual environment involve me.			
During the (technology) experience, the auditory aspects of the virtual environment involve me.			
During the (technology) experience, I was able to actively survey or search the environment using vision.			
During the (technology) experience, my sense of moving around inside the virtual environment was compelling.			
Engagement *(adapted from O'Brien et al., 2018; O'Brien & Toms, 2010)*			
I was absorbed in the (technology) experience.			
Using (technology) in the experience was worthwhile.			
My (technology) experience was rewarding.			
The time I spent using (technology) just slipped away.			
I felt interested in this (technology) experience.			
Behavioral intentions *(adapted from Huang et al., 2013; Bigné et al., 2001)*			
After the (place + technology) experience, I want to find out more information about the destination.			
After the (place + technology) experience, I will try to visit the destination in person in the future.			
Type of tourism			
I consider that this video is related to…	City tourism ▫	Nature tourism ▫	Sports tourism ▫
The approach of this video is… Passive (lower leading role, more static) Active (higher leading role, more motion)			

Figure 1. Research model

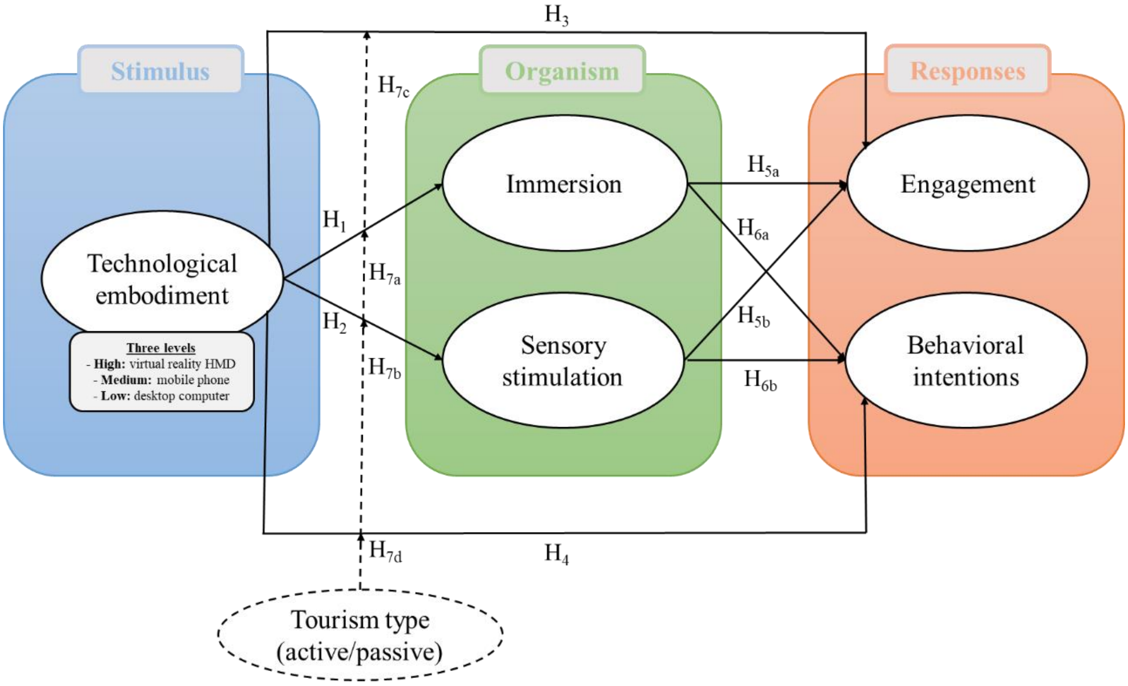

Figure 2. Interaction effects

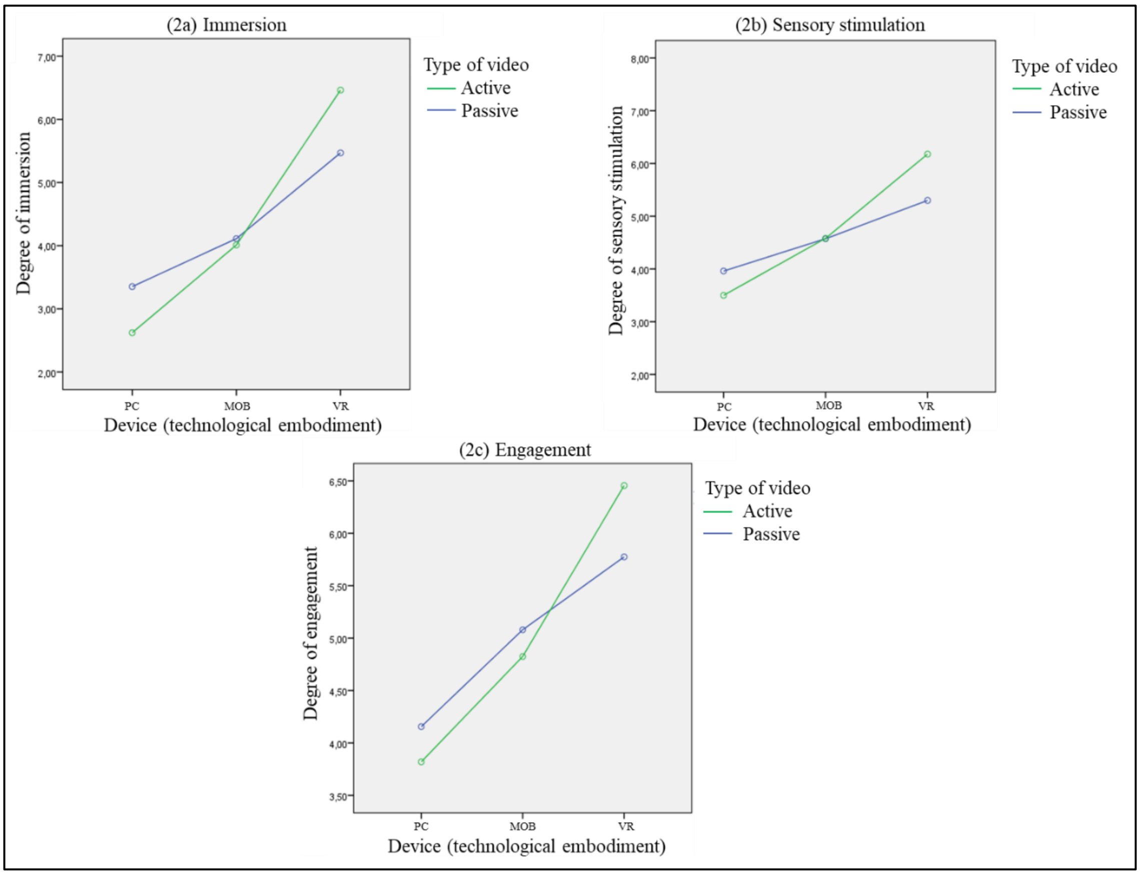

Table 1. Descriptive statistics per experimental cell

		Immersion	Sensory stimulation	Engagement	Behavioral intentions
Device	**Type of tourism**	**M (SD)**	**M (SD)**	**M (SD)**	**M (SD)**
Desktop PC	Passive	3.35 (1.405)	3.96 (1.197)	4.16 (1.280)	4.44 (1.616)
	Active	2.62 (1.277)	3.50 (1.427)	3.82 (1.385)	4.18 (1.729)
	Total	**3.02 (1.387)**	**3.75 (1.316)**	**4.00 (1.329)**	**4.33 (1.661)**
Mobile phone	Passive	4.11 (1.420)	4.57 (1.260)	5.08 (1.203)	5.03 (1.438)
	Active	4.01 (1.168)	4.58 (1.151)	4.85 (1.033)	4.95 (1.340)
	Total	**4.06 (1.287)**	**4.58 (1.195)**	**4.95 (1.116)**	**4.99 (1.377)**
VR HMD	Passive	5.47 (1.123)	5.30 (0.695)	5.78 (0.947)	4.89 (1.348)
	Active	6.46 (0.649)	6.18 (0.723)	6 46 (0.677)	5.31 (1.426)
	Total	**5.99 (1.026)**	**5.76 (0.831)**	**6.14 (0.879)**	**5.11 (1.395)**
Total	Passive	4.28 (1.585)	4.59 (1.208)	4.97 (1.332)	4.77 (1.486)
	Active	4.49 (1.917)	4.84 (1.569)	5.12 (1.514)	4.85 (1.555)
	Total	**4.38 (1758)**	**4.71 (1.402)**	**5.04 (1.424)**	**4.81 (1.518)**

Table 2. Results of the univariate effects

	Immersion			Sensory stimulation			Engagement			Behavioral intentions		
Variable	***F***	***Partial η^2***	**Power**	***F***	***Partial η^2***	**Power**	***F***	***Partial η^2***	**Power**	***F***	***Partial η^2***	**Power**
Experience in the destination	1.461	0.008	0.225	2.853	0.015	0.390	0.001	0.000	0.050	4.001*	0.021	0.512
Pref. for the type of tourism	0.083	0.000	0.059	0.125	0.001	0.064	0.034	0.000	0.054	1.646	0.009	0.248
Experience with the technology	0.026	0.000	0.053	1.309	0.007	0.207	0.313	0.002	0.086	2.802	0.015	0.384
Technological innovativeness	1.810	0.010	0.268	1.014	0.005	0.171	2.136	0.011	0.307	1.456	0.008	0.225
Device	98.827**	0.515	1.000	56.428**	0.378	1.000	57.436**	0.382	1.000	6.411**	0.064	0.899
Type of tourism	0.671	0.001	0.071	0.905	0.000	0.052	0.823	0.000	0.056	0.805	0.000	0.057
Device x type of tourism	9.211**	0.090	0.975	6.408**	0.064	0.899	4.572*	0.047	0.771	0.955	0.010	0.214

Note: ** $p < 0.01$; * $p < 0.05$

Table 3. Results of the analysis of the mediation model on engagement

Predictor	**Coeff.**	**SE**	***t***	***p***	**LLCI**	**ULCI**
Immersion						
Constant	3.398	0.40	8.587	0.000	2.617	4.179
X1 (desktop PC vs. otherwise)	1.011	0.22	4.515	0.000	0.569	1.452
X2 (VR HMD vs. otherwise)	1.951	0.23	8.364	0.000	1.491	2.411
Experience in the destination	-0.245	0.23	-1.082	0.281	-0.692	0.202
Pref. for the type of tourism	-0.015	0.055	-0.278	0.781	-0.123	0.092
Experience with the technology	0.003	0.045	0.074	0.941	-0.086	0.093
Technological innovativeness	-0.076	0.067	-1.125	0.262	-0.208	0.057
Model Summary	**$R^2 = 0.512$; $F_{(6, 189)} = 33.513$, $p < 0.001$**					
Sensory stimulation						
Constant	3.783	0.36	10.600	0.000	3.077	4.489
X1 (desktop PC vs. otherwise)	0.753	0.20	3.721	0.000	0.354	1.153
X2 (VR HMD vs. otherwise)	1.306	0.21	6.192	0.000	0.890	1.723
Experience in the destination	-0.387	0.20	-1.886	0.061	-0.791	0.018
Pref. for the type of tourism	0.010	0.05	0.196	0.845	-0.088	0.107
Experience with the technology	0.055	0.04	1.336	0.183	-0.026	0.135
Technological innovativeness	-0.049	0.06	-0.801	0.424	-0.169	0.071
Model Summary	**$F_{(6, 189)} = 19.090$, $p < 0.001$**					
Engagement						
Constant	1.277	0.28	4.531	0.000	0.721	1.833
X1 (desktop PC vs. otherwise)	0.267	0.13	2.015	0.045	0.005	0.528
X2 (VR HMD vs. otherwise)	-0.065	0.15	-0.425	0.671	-0.368	0.237
Immersion	0.237	0.06	4.266	0.000	0.127	0.347
Sensory stimulation	0.589	0.06	9.582	0.000	0.468	0.710
Experience in the destination	0.263	0.13	2.047	0.042	0.009	0.516
Pref. for the type of tourism	-0.002	0.03	-0.069	0.945	-0.063	0.058
Experience with the technology	-0.049	0.02	-1.915	0.057	-0.099	0.002
Technological innovativeness	-0.032	0.04	-0.847	0.398	-0.107	0.043
Model Summary	**$R^2 = 0.770$; $F_{(8, 187)} = 78.299$, $p < 0.001$**					
TOTAL EFFECT MODEL: Engagement						
Constant	4.310	0.36	12.008	0.000	3.602	5.018
X1 (desktop PC vs. otherwise)	0.950	0.20	4.480	0.000	0.550	1.351
X2 (VR HMD vs. otherwise)	1.167	0.21	5.513	0.000	0.749	1.584
Experience in the destination	-0.023	0.21	-0.111	0.912	-0.428	0.383
Pref. for the type of tourism	0.000	0.05	-0.001	0.999	-0.098	0.098
Experience with the technology	-0.016	0.04	-0.391	0.696	-0.097	0.065
Technological innovativeness	-0.080	0.06	-1.290	0.198	-0.199	0.042
Model Summary	**$R^2 = 0.393$; $F_{(6, 189)} = 20.399$, $p < 0.001$**					
Relative total effects of X on Y	***Effect***	**SE**	***t***	***p***	**LLCI**	**ULCI**
X1 (desktop PC vs. otherwise)	0.950	0.20	4.679	0.000	0.550	1.351
X2 (VR HMD vs. otherwise)	1.167	0.21	5.513	0.000	0.749	1.584
Omnibus test of total effect of X on Y	**R^2 change = 0.359** **$F_{(2, 189)} = 55.922$, $p < 0.001$**					
Relative indirect effects of X on Y	***Effect***	**BootSE**	**BootLLCI**		**BootULCI**	
Embodiment → Immersion → Engagement						
X1 (desktop PC vs. otherwise)	0.240	0.09	0.091		0.450	
X2 (VR HMD vs. otherwise)	0.463	0.12	0.232		0.706	
Bootstrap results for indirect effects	***Effect***	**BootSE**	**BootLLCI**		**BootULCI**	
Embodiment → Sensory stimulation → Engagement						
X1 (desktop PC vs. otherwise)	0.311	0.09	0.130		0.486	
X2 (VR HMD vs. otherwise)	0.540	0.11	0.336		0.764	

Note: *n* = 196. Confidence interval calculated at 95% of significance. Bootstrap sample size = 5,000. BootLLCI: lower limit confidence interval; BootULCI: upper limit confidence interval.

Table 4. Results of the analysis of the mediation model on behavioral intentions

Predictor	**Coeff.**	**SE**	***t***	***p***	**LLCI**	**ULCI**
Behavioral intentions						
Constant	2.154	0.55	3.932	0.000	1.073	3.235
X1 (desktop PC vs. otherwise)	0.248	0.26	0.962	0.338	-0.261	0.756
X2 (VR HMD vs. otherwise)	-0.165	0.30	-0.552	0.581	-0.753	0.424
Immersion	-0.132	0.11	-1.219	0.224	-0.345	0.081
Sensory stimulation	0.594	0.12	4.971	0.000	0.358	0.830
Experience in the destination	-0.368	0.25	-1.472	0.143	-0.860	0.125
Pref. for the type of tourism	0.086	0.06	1.440	0.151	-0.032	0.203
Experience with the technology	0.061	0.05	1.232	0.219	-0.037	0.159
Technological innovativeness	-0.074	0.07	-0.999	0.319	-0.219	0.072
Model Summary	**$R^2 = 0.234$; $F_{(8, 187)} = 7.158$, $p < 0.001$**					
TOTAL EFFECTS MODEL: Behavioral intentions						
Constant	3.953	0.47	8.481	0.000	3.034	4.873
X1 (desktop PC vs. otherwise)	0.562	0.26	2.131	0.034	0.042	1.082
X2 (VR HMD vs. otherwise)	0.354	0.27	1.288	0.199	-0.188	0.896
Experience in the destination	-0.565	0.27	-2.115	0.036	-1.091	-0.038
Pref. for the type of tourism	0.094	0.06	1.456	0.147	-0.033	0.220
Experience with the technology	0.093	0.05	1.751	0.082	-0.019	0.198
Technological innovativeness	-0.093	0.08	-1.168	0.244	-0.249	0.064
Model Summary	**$R^2 = 0.098$; $F_{(6, 189)} = 3.424$, $p < 0.05$**					
Relative total effects of X on Y	***Effect***	**SE**	***t***	***p***	**LLCI**	**ULCI**
X1 (desktop PC vs. otherwise)	0.562	0.26	2.131	0.034	0.042	1.082
X2 (VR HMD vs. otherwise)	0.354	0.27	1.288	0.199	-0.188	0.896
Omnibus test of total effect of X on Y	**R^2 change = 0.061** **$F_{(2, 189)} = 6.396$, $p < 0.01$**					
Relative indirect effects of X on Y	***Effect***	**BootSE**	**BootLLCI**		**BootULCI**	
Embodiment → Immersion → Behavioral intentions						
X1 (desktop PC vs. otherwise)	-0.133	0.12	-0.382		0.074	
X2 (VR HMD vs. otherwise)	-0.257	0.21	-0.691		0.145	
Bootstrap results for indirect effects	***Effect***	**BootSE**	**BootLLCI**		**BootULCI**	
Embodiment → Sensory stimulation → Behavioral intentions						
X1 (desktop PC vs. otherwise)	0.447	0.16	0.171		0.771	
X2 (VR HMD vs. otherwise)	0.776	0.19	0.452		1.185	

Note: *n* = 196. Confidence interval calculated at 95% of significance. Bootstrap sample size = 5,000. BootLLCI: lower limit confidence interval; BootULCI: upper limit confidence interval.