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Immersive experiences as a resource for promoting museum tourism in the Z and millennials generations

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ABSTRACT

In recent years, immersive experiences have gained a leading role in cultural and museum tourism. However, not all the benefits of virtual reality as a promotional tool for museum tourism, especially among the younger generation, are being exploited. This paper conducted an experiment in three different immersive scenarios, using the virtual reality headset, the mobile application plus virtual reality glasses and video on a computer screen. The sample contained 157 young people from Gen Z and Millennials. The results have shown that, with higher experience immersion levels, there are higher levels of affective and conative performance in young people. In addition, where there are higher levels of immersive experience, young people with an active cultural profile have an increased affective and conative performance. Likewise, these young people are more proactive with the intention of an actual visit to the museum.

1. Introduction

Virtual reality (VR) is a fundamental part of the advancement of immersive technologies that has been used for more than 25 years in multiple disciplines and different contexts (Cipresso et al., 2018; Flavián et al., 2019a). It is for this reason that definitions of VR vary throughout the literature with one of the most extended definitions of VR being that it is an immersive 3D simulated environment that allows consumers to have the sensation of being in a real-world environment (Guttentag, 2010; Loureiro et al., 2020). In this way VR could be considered as "a fully synthetic world that may or may not mimic the real world" (Loureiro et al., 2020, p. 2). Recently, VR has been used by cultural tourism, since some of its characteristics can be of help in offering tourists' unique experiences (Bruno et al., 2010). VR reduces the problem of the distance between potential tourists and a tourist destination, since it provides them with closer-to-reality information, improving their understanding of the destination before visiting it (Accenture, 2018; Kim & Hall, 2019), which, in the case of museums, could have similar effects. Additionally, VR improves the tourists' experiences by facilitating their interaction with destinations (Kang & Gretzel, 2012). Finally, VR offers tourists an educational and entertainment experience in a complete virtual environment in which to immerse themselves (Jung et al., 2016; Lee et al., 2020). According to the review of VR in the tourist context by Loureiro et al. (2020), the pre-purchase process of a tourist experience is close to becoming a total immersive experience. This is possible since potential tourists can use VR to fully participate in a pre-experience that allows them to evaluate different destinations or places (e.g., hotels, museums, etc.) before making a decision.

However, few studies have considered that VR can replace a physical visit to a tourist site (e.g. Guttentag, 2010). So, VR can reduce the inconvenience of physically visiting a museum (e.g., waiting times at the ticket office, entrance queues, etc.) and can get tourists to replace physical visits to museums with a realistic virtual simulation (Lee et al., 2020). However, Dewailly (2007), among others, has shown that individuals think that conducting a virtual tour is not a substitute for a real tour, but an effective tool to promote it.

Nowadays, the role of VR is becoming increasingly important for the museums, as helping them overcome two major problems: authenticity and new museology. First, authenticity is posed as objectivism in tourism and has two vital components to provide tourism value: distance and reality (Taylor, 2001). The need for museums to preserve their collections and, in turn, make a change in their mission and focus on their current and future visitors (Pallud & Straub, 2014), this authenticity can be achieved by the advances in information technology, since it allows visitors to explore and fully appreciate the museums, overcoming the temporal, spatial and linguistic barriers (Chung et al., 2015).

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Secondly, the new museology refers to the paradigm shift in museums, which no longer merely exhibit their collections, but also try to enrich the experience of visitors (Lee et al., 2020). Therefore, museums are focusing their efforts on improving the educational and entertainment experience of their visitors (Pallud & Straub, 2014). Therefore, VR is a fundamental tool that allows museums to improve the visitor experience. However, Lee et al. (2020, p. 9) state that "research on the results of immersive museum environments in VR is still in an embryonic stage". Likewise, there is no research that thoroughly analyses the effect of immersion in visitor experience and, more specifically, in young visitors.

This research has focused on the young audience due to two reasons: their familiarity with technology in general and with immersive experiences in particular, and the interest that museums have in attracting this segment (Gofman et al., 2011). Young people are a very important segment for museums, but the number of young visitors, in spite of their efforts, is low (Drotner et al., 2017; Gofman et al., 2011). In a study made in the United Kingdom, visitors to museums between the ages of 16 and 24 represented only 18.44% (Museums, 2020). Similarly, in a study carried out by the Ministry of Culture and Sport of the Government of Spain showed that only 33.51% of the visitors are between 15 and 24 years (Anuario de Estadísicas Culturales, 2021). One possible explanation is that most of the marketing strategies of the exhibitions are not adapted to the world vision of young people (Mason & Mccarthy, 2006). Museums need to look for new ways of attracting them (Gofman et al., 2011). They must decrease "the sense of exclusion" which many young visitors feel, and experiment with new promotional strategies where new technologies are used to attract them (Mason & Mccarthy, 2006). These strategies must be interactivity, since these activities increase young people's interest in visiting museums (Goulding, 2000).

This paper aims to shed light on immersive experiences as a resource for the promotion of museums among the younger generation. From a review of the literature, several duly justified hypotheses are proposed, which are tested through an experimentation with three different scenarios: (1) virtual format with the HTC Vive Pro-Eye virtual reality headset (ES1_VR), (2) virtual format from an app with a 360° video via a mobile device and Cardboard-type VR glasses (ES2_MB + GL) and, (3) online format via a static video on a computer screen (ES3_VD). Once the experimentation was carried out, the data obtained was analysed and finally the main conclusions of the study were presented.

2. Research hypotheses

The experience immersion level can be defined as a system with specific experimental characteristics (Hudson et al., 2019; Slater, 2009). Slater (2009) established that one system is more "immersive" than another by simply adding an additional feature, e.g., higher screen resolution. Therefore, several authors define the immersion of the experience according to the VR system used (Hudson et al., 2019; Slater, 2009) and divide it into three levels: (a) fully immersive (e.g., cave automatic virtual environment —CAVEs—, head-mounted display—HMDs—), (b) semi-immersive (e.g., stereoscopic powerwalls), and (c) non-immersive (e.g., computers) (Cipresso et al., 2018; Loureiro et al., 2019). Non-immersive systems are simpler and cheaper, where computer equipment is used to reproduce images only (Cipresso et al., 2018), while fully immersive systems provide a complete simulated experience with the support of audio devices and sensory output devices, such as HMDs, to enhance stereoscopic vision of the environment by the movement of the user's head. Martínez-Navarro et al. (2019) propose an alternative way of categorising VR systems based on the human-machine interface: (1) computer monitors; (2) stereoscopic powerwalls; (3) smartphones connected to a mobile device VR headset; (4) HMDs and (5) CAVEs.

In the literature, the underlying affective and conative processes that occur during the virtual experiences have been studied in different ways. So, Flavián et al. (2020) studied, in the case of hotel guests, the affective route of individuals under virtual experiences with different technologies but from the point of view of technological embodiment. However, there is a gap in the literature about the connection between the experience immersion level, referred to the VR system used, and the affective and conative performance of the individual. Relying on the results of Flavián et al. (2020) and Kim et al. (2020), individual immersion, enjoyment and psychological engagement can be considered affective performance; while behavioural engagement and intention can be considered conative performance. The definition of these constructs and their effects are described below, as well as the formulated hypotheses.

2.1. Affective performance constructs

We must begin by differentiating between immersion of the experience and immersion of the individual using for this purpose the differentiation established by Lombard et al. (2009) between perceptive immersion and psychological immersion. Perceptive immersion refers to the immersive level of the VR system (Ma, 2019). Therefore, this refers to the immersion of experience. However, psychological immersion describes the feeling of being absorbed in the virtual environment (Ma, 2019). Therefore, psychological immersion refers to the immersion of the individual in the experience and forms part of affective performance. According to Williams and Hobson (1995, p. 424) "immersion is the degree of suspension of disbelief by the VR participant and is created through a field of view, panorama surrounding the participant, viewer-centred perspective (where images react to the head and body movements), and a body or physical representation of objects" (Willems et al., 2019).

In the literature, the concept of immersion of the individual is a multifaceted construct and is closely related to the concept of presence, since both (immersion of the individual and presence) are linked to the feeling of physical immersion in a virtual environment, as well as psychological presence (Guttentag, 2010; Hudson et al., 2019; Willems et al., 2019). Moreover, the immersion of the individual is also related to the concept of flow, since both refer to the level of involvement of the individual in the experience (Hudson et al., 2019; Willems et al., 2019). The flow is the maximum level of immersion of the individual (Kim et al., 2020), where the individual can experience a loss of self-awareness and a modified sense of time (Csikszentmihalyi, 1990; Hudson et al., 2019). Flow differs from immersion in that it is fleeting and only occurs during a moment of the experience (Brown & Cairns, 2004; Jennett et al., 2008). In other words, people may feel immersed in varying degrees during an experience, but the flow requires reaching maximum immersion (Hudson et al., 2019). That is why in this work the construct of the immersion of the individual considers both the presence and the flow.

Another construct included in affective performance is enjoyment. In general, enjoyment is defined as "the extent to which the activity of using a specific system is perceived to be enjoyable on its own right, aside from any performance consequences resulting from system use" (Davis et al., 1992; Jang & Park, 2019; Venkatesh, 2000). This concept in virtual environments is described with attributes such as enjoyable, exciting, pleasant and interesting (Guo & Barnes, 2011). Kim et al. (2020) validated this construct of enjoyment by preserving the enjoyable and pleasant attributes and, adding the fun and happy attributes. According to literature, enjoyment levels increase in the face of a greater sense of reality during the experience (Schuemie et al., 2001; Suh & Lee, 2005; Tussyadiah et al., 2018).

Finally, the individual's engagement construct, which can be analysed both from a psychological and behavioural point of view (Fang et al., 2017; Flavián et al., 2020; Romero, 2017), will be used in its psychological facet as part of affective performance O'Brien et al. (2018) defined the psychological engagement as that generated by the interaction between the individual and the virtual experience, which includes factors related to focusing attention (i.e., feeling absorbed in the interaction), aesthetic appeal (i.e., the general and visual appeal of the

interface) and the reward (i.e., the degree of perceived interest and success of the interaction). Flavián et al. (2020) demonstrated that technological personification (interaction between the individual and the virtual experience) positively influences the psychological engagement in the tourism context.

Despite the scarce VR literature in the context of museum, the results of Flavián et al. (2020) and Kim et al. (2020), provide theoretical support for the following hypothesis and sub-hypothesis.

H1. Immersion of experience has a positive effect on affective performance.

H1a. Immersion of experience has a positive effect on the immersion of the individual.

H1b. Immersion of experience has a positive effect on the enjoyment of the individual.

H1c. Immersion of experience has a positive effect on the individual's psychological engagement.

2.2. Conative performance constructs

The conative processes that occur after virtual experiences have been studied from different perspectives. For example, in the tourism context, VR experiences are considered to be very beneficial, since they encourage "proof before buying", which improves the diagnosis of information by creating realistic images in their minds and encourages behavioural intentions (Tussyadiah et al., 2018). It has been shown that VR headsets, in the tourism context, generate greater intention to share the experience on social media and to recommend it to friends and family (Errichiello et al., 2019; Griffin et al., 2017). However, none of these studies has established the connection between the experience immersion level, as defined in this paper above, and the conative performance of the individual.

As previously mentioned, the individual's engagement is also composed of behavioural engagement (Fang et al., 2017; Flavián et al., 2020; Romero, 2017), which is a construct of conative performance. Behavioural engagement has been defined as manifestations of user behaviour toward an object (e.g., brand, virtual experiences, etc.) that go beyond the intention (Flavián et al., 2020; van Doorn et al., 2010). These behavioural manifestations include, among others, word-of-mouth dissemination and the provision of assistance and recommendations to others (Flavián et al., 2020; Romero, 2017; van Doorn et al., 2010).

According to the literature, the intention reflects users' desire to carry out certain behaviours (Flavián et al., 2019b). Previous studies show that VR technologies can offer "try-before-you-buy" experiences (Flavián et al., 2019b; Marasco et al., 2018; Tussyadiah et al., 2018). In this paper, intention measures the predisposition of an individual to continue to seek and have other virtual experiences similar to those this individual has experienced. In VR literature, the influence of past VR experiences on the intention of carrying out future action has been widely studied, more specifically in the tourism field, on the intention of visiting a place (e.g. Flavián et al., 2019a; Kim & Hall, 2019). In the context of the review made, no studies have been found that analyse the background of intention to repeat virtual experiences.

Based on the above, the following hypotheses and sub-hypotheses are proposed.

H2. Immersion of experience has a positive effect on conative performance.

H2a. Immersion of experience has a positive effect on the individual's behavioural engagement.

H2b. Immersion of experience has a positive effect on the intention of the individual.

2.3. Cultural intensity in affective and conative performance

Given that the different lifestyles of the individuals belonging to Gen Z and Millennials can influence the relationship between the experience immersion level and the affective and conative performance, it has been considered desirable to approach it as a covariate. In other words, to analyse whether cultural intensity as a lifestyle proxy has a homogeneous effect on endogenous constructs (individual immersion, enjoyment, psychological engagement, behavioural engagement, and intention) regardless of the experimental scenario applied. For this purpose, we have considered the number of cultural activities carried out by the participants as cultural intensity, based on the AIO (Activities, Interest and Opinion) scale. This scale, developed by González (1998), has been widely used to study lifestyles and show their explanatory value by applying them to the study of cultural tourism behaviour (González, 2005). In addition, the AIO scale has proven to be optimal for tourism segmentation in general (Barlés-Arizón & Fraj-Andrés, 2007) and cultural in particular (González, 2005). Barlés-Arizón et al. (2010), suggest that lifestyles could explain the behaviour in the holiday decision-making process and would be able to determine the choice of activities to carry out during the holidays.

Based on these findings, the following hypotheses are proposed.

H3. Individuals with greater cultural intensity show higher levels of affective performance (immersion, enjoyment, and psychological engagement).

H4. Individuals with greater cultural intensity show higher levels of conative performance (behavioural engagement and intention).

2.4. The cultural profile of young people and the affective and conative performance

The AIO scale of activities is divided in turn into two activities subscales: one of them refers to "outdoor cultural activities" and the other to "indoor cultural activities" (Barlés-Arizón et al., 2010). The first subscale brings together those activities that require greater interaction on the part of the individual (active role); while the other subscale collects more passive activities, i.e., those that do not involve an effort on the part of the viewer (passive role). That is why, in this paper, we will try to analyse whether the cultural profile (active/passive) of young people differs in the relationship between immersion of experience and affective and conative performance. Therefore, the following hypotheses are proposed.

H5. Individuals with an active cultural profile show increased affective performance (immersion, enjoyment, and psychological engagement) depending on the level of immersion of the experience.

H6. Individuals with an active cultural profile show increasing conative performance (behavioural engagement and intention) depending on the level of immersion of the experience.

Since the literature on immersive experiences in tourism has shown that immersion of experience improves the intentions of behaviour toward a tourist destination (Kim & Hall, 2019) and that, with greater immersion of experience, a greater willingness to seek information about a tourist destination is generated (Griffin et al., 2017), in this study, the following hypothesis is formulated.

H7. Individuals with an active cultural profile show a more proactive attitude of information search and visit intention.

3. Materials and methods

The field work was carried out in a Spanish university laboratory between April and July 2021. The final sample comprised 157 individuals aged 15–34 years, with a focus on Gen Z and Millennials. The recruitment of participants was carried out through a relational

sampling method. The participants attended the experiment on a voluntary and unpaid basis, where they were initially informed of the procedure to be followed. The sample was formed respecting the gender and age quotas of the profile of museum visitors according to the 2019 Yearbook of Cultural Statistics prepared by the Ministry of Culture and Sport of the Government of Spain. Table 1 shows the sociodemographic profile of the sample.

The experimentation consists of three different experimental scenarios. In all scenarios, participants were exposed to the same stimulus titled "Mona Lisa: Beyond the Glass" (interactive VR video), which was created by the Louvre Museum and is available for free. The only difference between the three experimental scenarios was the degree of immersion of the experience, which was achieved through the technological device used for the participants to visualise the stimulus (head-mounted display-HDM-, mobile device & VR glasses and computer screen). According to the literature (Hudson et al., 2019; Slater, 2009), the head-mounted display-HDM-is fully immersive, mobile device & VR glasses is semi-immersive and computer screen is non-immersive. In addition, the exposure time of participants in the three experimental scenarios was the same (460 s).

It was necessary to implement a safety protocol due to the COVID-19 pandemic, approved by the University and where all the hygiene measures were established to maintain the health and safety of the participants. When a participant arrived at the laboratory, he/she had to clean his/her hands with hydroalcoholic gel and change the COVID19 mask. This participant was randomly assigned to one of the three experimental scenarios. After viewing the stimulus, they were asked to complete a questionnaire. At the end of the experiment, the experimenter proceeded to disinfect the laboratory and prepare it for the next participant. The three experimental scenarios were conducted in the same university laboratory, with the same lighting and ambient noise conditions, providing identical experimental conditions for all participants.

The first scenario (ES1_VR) consisted of visualising this stimulus in virtual format from the VR Steam platform with the head-mounted display (HTC Vive Pro-Eye). In this scenario, participants could interact with the stimulus, for example, by approaching any of the elements in the video or by walking around the environment. In the second scenario (ES2_MB + GL), this stimulus was visualised in virtual format, but from an app with a 360° video via a mobile device and Cardboard-type VR glasses. In this second scenario, participants were able to visualise the whole environment but simply by moving their heads from side to side. The third scenario (ES3_VD) consisted of visualising this stimulus in online format, via a static video on a 24" computer screen. In this third scenario, participants could only view the video with no interaction option.

There are no significant differences in the socio-demographic profile of the participants between the three experimental scenarios (sex: χ^2 (2) = 0.781, p = .677; age: χ^2 (5) = 14.536, p = .069; education: χ^2 (3) = 4.794, p = .309; working: χ^2 (2) = 1.986, p = .370). These results together with the existence of significant differences in the level of individual immersion between the three experimental scenarios (see Table 6) guarantee the success of the manipulation check. Therefore, it is possible to draw more precise conclusions.

Table 1
Sample profile.

Sociodemographic characteristics	N	%
Sex		
Male	76	48.4
Female	81	51.6
Age		
15–18	53	33.8
19–22	29	18.4
23–26	43	27.4
27–30	13	8.3
31–34	19	12.1
Education		
Primary	13	8.3
Secondary	81	51.6
University	63	40.1
Working		
Yes	42	26.8
No	115	73.2
Total	157	100.0

3.1. Measures

Cultural intensity, measured by the level of interest of the participant toward different cultural activities, such as reading, visiting museums, concerts, etc. This scale is based on the scale from "Survey of cultural habits and practices 2014–2015" conducted by the Ministry of Education, Culture and Sport of the Government of Spain, which is based on the cultural activities included in the AIO scale (González, 1998). It consists of 8 items that were measured using a 7-point Likert scale where 1 meant "not interested" and 7 "full interest".

Immersion, used to measure presence and flow items, consisting of four items adapted from the literature (De Gauquier et al., 2019; Kim et al., 2020; Willems et al., 2019) and using a 7-point Likert scale where 1 meant "strongly disagree" and 7 "strongly agree".

Enjoyment, measured by the designed and validated 4-item scale from Kim et al. (2020). The items were measured using the same Likert scale as in Immersion.

Psychological engagement, measured through 4 items adapted from the literature (Flavián et al., 2019b, 2020; O'Brien et al., 2018) and using the same Likert scale as in Immersion.

Behavioural engagement, measured through 3 items extracted from the literature (Flavián et al., 2020; Jang & Park, 2019) and using the same Likert scale as in Immersion.

Intention, measured through 2 items adapted from the literature (Flavián et al., 2020; Jang & Park, 2019) and using the same Likert scale as in Immersion.

Table 2 shows all the items. All constructs are reflective except for cultural intensity, which is formative.

4. Results

4.1. Validation of measurement scales

The scales were validated using partial least squares (PLS) estimation, which is appropriate when reflective and formative constructs are used and for obtaining the individuals' scores on each construct in a weighted manner (Hair et al., 2019). SmartPLS v3.3.7 software was used.

Diamantopoulos (2008) recommendations were considered to validate the formative scale of cultural intensity. The scores of variance inflation factor (VIF) were below 3 (see Table 2), which confirmed the non-existence of multicollinearity among the indicators (Hair et al., 2019). Also, indicator weights and their significance were analysed to determine their relevance (Hair et al., 2019). Since only two of the indicators had significant weights (CI_1 and CI_8 (Hair et al., 2019). These indicators show loadings above 0.5, except for indicator "CI_6", which was retained to ensure content validity.

For validating the reflective scales, the following criteria must be considered: individual reliability, composite reliability, convergent validity, and discriminant validity. Table 2 shows the results.

The individual reliability of the indicators was considered acceptable, as the loadings had a λ value higher than the threshold of 0.7 established by Hair et al. (2019).

The values of composite reliability (CR) and Cronbach's alpha corroborated the internal consistency of the reflective scales as they exceed the minimum of 0.7 (Hair et al., 2019). The rho_A values were also higher than 0.7 (Dijkstra & Henseler, 2015), which are in line with CR y alpha.

Table 2
Validation of scales.

Constructs/Indicators		VIF	Weight	Loading	Alpha	CR	rho_A	AVE
IMMERSION (IMM)	IMM_1: While I was in the virtual/online experience, I felt like I was in the world that the experience created			0.839***	0.854	0.902	0.859	0.696
	IMM_2: While I was in the experience, my body was in the room, but my mind was inside the virtual/online experience			0.853***				
	IMM_3: While I went through the virtual/online experience, I was totally captivated			0.852***				
	IMM_4: When I went through the virtual/online experience, the time passed very quickly			0.791***				
ENJOYMENT (ENJ)	ENJ_1: The virtual/online experience has been enjoyable for me			0.859***	0.913	0.938	0.916	0.792
	ENJ_2: The virtual/online experience has been pleasant for me			0.912***				
	ENJ_3: The virtual/online experience has been fun for me			0.907***				
	ENJ_4: The virtual/online experience has made me happy			0.881***				
PSYC. ENGAGEMENT (P_ENG)	P_ENG_1: I found the virtual/online experience visually appealing			0.844***	0.885	0.920	0.890	0.743
	P_ENG_2: The virtual/online experience captivated my senses			0.908***				
	P_ENG_3: Using the virtual/online experience was worth it			0.857***				
	P_ENG_4: The virtual/online experience awakened my interest			0.835***				
BEH. ENGAGEMENT (B_ENG)	B_ENG_1: I would recommend this type of virtual/online visits to friends, family or work colleagues			0.912***	0.900	0.937	0.904	0.833
	B_ENG_2: I would take every opportunity to recommend this type of virtual/online visits to friends, family or colleagues			0.898***				
	B_ENG_3: I would comment the positive aspects of such visits to friends, family or colleagues			0.926***				
INTENTION (INT)	INT_1: I intend to continue to make this type of virtual visit			0.957***	0.908	0.956	0.908	0.916
	INT_2: I intend to look for other virtual visits similar to these			0.957***				
CULTURAL INTENSITY (CI)	CI_1: Read in general (books, newspapers, magazines, etc.)	1.304	0.350**		N.A.	N.A.	N.A.	N.A.
	CI_2: Go to libraries (physical and online)	1.440	−0.006	0.508***				
	CI_3: Visit museums	2.518	0.265	0.739***				
	CI_4: Visit exhibitions (outside of a museum) or art galleries	2.097	-0.009	0.614***				
	CI_5: Visit monuments or archaeological places	1.719	0.364	0.675***				
	CI_6: Go to the cinema	1.326	0.010	0.223				
	CI_7: Go to theatre, opera, zarzuela, ballet or dance, circus, etc.	1.727	0.141	0.535***				
	CI_8: Attend concerts, listen to music, etc.	1.213	0.434**					

Note: VIF-variance inflation factor; Alpha– Cronbach's alpha; CR-composite reliability; AVE – average variance extracted; n = 1000 subsamples; ***p-value ≤.001, **p-value ≤.05.

The average variance extracted values (AVE) were also above the recommended value of 0.5 (Hair et al., 2019) indicating good convergent validity, which indicates that more than 50% of the construct variance was explained by its indicators.

Discriminant validity was analysed according to Fornell and Lacker's criterion and Hair et al. (2019). As shown in Table 3, the square root of the AVE of each construct exceeds the correlations between the other constructs (see diagonal in Table 3) and the HTMT values fell below 0.9. These results indicate that there is discriminant validity.

In summary the scales used are reliable and valid, and therefore the hypotheses can be tested.

4.2. Analysis of the influence of the experimental scenario on affective and conative performance

MANCOVA was used to test simultaneously the influence of each experimental scenario on the various endogenous constructs. This analysis was done with the IBM SPSS v27 software, using the latent variables from the preliminary PLS analysis. The final model is expressed as follows:

$$y_{ijk} = \mu + \alpha_j + \beta \cdot X_k + \varepsilon_{ijk} \quad \text{(eq 1)}$$

Where*yijk* is the value of the endogenous constructs for the i individual, the j modality of scenario (α_j), and the k value of the covariable cultural intensity (*Xk*).

The possible interference of cultural intensity in the estimation of endogenous constructs required its inclusion as a confound variable and exogenous variable. The need for this prior analysis is due to the possibility that cultural intensity may influence differences in the endogenous variables means depending on the scenario applied. MANCOVA analysis confirmed that the interaction between the experimental scenario and cultural intensity has not been significance (Wilks' $\Lambda = 0.973$; $F = 0.407$; d. f.1 = 10; d. f.2 = 294; $p = .943$). This indicates that cultural intensity has a homogeneous effect on endogenous constructs regardless of the scenario applied.

The means of endogenous constructs show that the ES1_VR scenario is the one that reaches the highest values in all constructs, followed by the ES2_MB + GL scenario and, finally, the ES3_VD scenario (see Table 4). The only exception occurs in Psychological Engagement, where the mean is higher in ES3_VD compared to ES2_MB + GL (6.10

Table 3
Discriminant validity.

Constructs	IMM	ENJ	P_ENG	B_ENG	INT
IMM	*0.834*	0.816	0.890	0.779	0.749
ENJ	0.724	*0.890*	0.879	0.862	0.686
P_ENG	0.776	0.787	*0.862*	0.868	0.740
B_ENG	0.689	0.784	0.776	*0.912*	0.805
INT	0.663	0.627	0.668	0.730	*0.957*

Note: n = 1000 subsamples. The square root of the AVE of each construct (on the diagonal), HTMT (above the diagonal) and correlations between constructs (below the diagonal).

Table 4
Descriptive statistics.

Constructs	Total (N = 157)		ES1_VR (N = 50)		ES2_MB + GL (N = 50)		ES3_VD (N = 57)	
	M	SD	M	SD	M	SD	M	SD
IMM	5.65	1.14	6.14	0.90	5.64	1.13	5.24	1.20
ENJ	6.22	0.98	6.59	0.67	6.08	1.17	6.02	0.95
P_ENG	6.29	0.93	6.63	0.56	6.10	1.16	6.15	0.90
B_ENG	6.09	1.02	6.43	0.79	6.07	1.04	5.82	1.12
INT	5.37	1.31	5.86	1.21	5.18	1.30	5.11	1.29

and 6.15, respectively).

Results of Table 5 indicate the existence of an effect of the scenario on all endogenous constructs considered together (Wilks' $\Lambda = 0.832$; $F = 2.866$; d. f.1 = 10; d. f.2 = 298; $p = .002$). Therefore, the results of Tables 4 and 5 support H1 and H2.

Results of individual variance analyses for each construct are: immersion ($F = 7.541$, d. f.1 = 2; d. f.2 = 153; $p = .001$), enjoyment ($F = 4.752$, d. f.1 = 2; d. f.2 = 153; $p = .010$), psychological engagement ($F = 4.671$, d. f.1 = 2; d. f.2 = 153; $p = .011$), behavioural engagement ($F = 3.819$, d. f.1 = 2; d. f.2 = 153; $p = .024$) and intention ($F = 4.624$, d. f.1 = 2; d. f.2 = 153; $p = .011$). These results indicate that the level of immersion in experience also generates an individual effect in each of the constructs that make up the affective performance (immersion, enjoyment, and psychological engagement), supporting H1a, H1b and H1c, as well as those that make up the conative performance (behavioural engagement, and intention), supporting H2a and H2b.

The estimated parameters indicate that cultural intensity acts as an explanatory variable with statistical significance in all the constructs: immersion ($\beta = 0.320$; $t = 5.839$; $p = .000$), enjoyment ($\beta = 0.200$; $t = 3.973$; $p = .000$), psychological engagement ($\beta = 0.178$; $t = 3.663$; $p = .000$), behavioural engagement ($\beta = 0.234$; $t = 4.469$; $p = .000$) and intention ($\beta = 0.344$; $t = 5.299$; $p = .000$). That is, the greater the cultural intensity, the higher the levels of affective and conative performance, thus supporting H3 and H4.

To explore these differences further, a one-way ANOVA and a Tukey's test were made by scenario. Table 6 show that there are significant differences in all constructs depending on the scenario. However, the Tukey's test indicates that these differences occur between the ES1_VR and the other two scenarios in all cases, with the exception of behavioural engagement, in which the differences are only observed between ES1_VR and ES3_VD.

4.3. Analysis of the cultural profile in affective and conative performance

Since the cultural profile is measured with a scale made up of items referring to a wide variety of cultural activities, it has been considered appropriate to conduct a k-means cluster to classify individuals into groups according to their cultural profile. Table 7 includes the results of this analysis and shows the centres of each of the two identified clusters. Cluster 1, labelled "Passive", represented 31.85% of the participants. This cluster is made up of individuals with cultural preferences more closely related to the audiovisual world and with more passive cultural activities, such as going to the cinema or attending concerts. Cluster 2, labelled "Active", was the largest group (68.15%) and is integrated by individuals with more cultural involvement, since it presents higher values in all indicators. Unlike the other cluster, it highlights activities that require a more active attitude of individuals, such as visiting museums, exhibitions or art galleries.

A test of mean differences was applied to determine if endogenous constructs differed among the two clusters (see Table 8). The results show mean differences in all the constructs, with the active profile having the highest values in all constructs.

For each cultural profile, the existence of mean differences in the endogenous constructs according to the scenario was also analysed using a one-way ANOVA and a Tukey's test. The results for the "Passive" cluster show only the existence of quasi-significant differences in the immersion of the individual between the ES1_VR and ES3_VD (see Table 9). For the other constructs, there are no marked differences, although the ES1_VR means are always higher. The results for the "Active" cluster indicate that there are significant differences in all the constructs, with differences in all cases between the ES1_VR and the other two scenarios. However, these results also show that there are no differences between ES2_MB + GL and ES3_VD in any of the constructs (see Table 10). These results show that individuals with a passive cultural profile are very difficult to attract through immersive experiences. Thus, although the level of immersion of the experience increases, there are no significant differences in their enjoyment, engagement (psychological and behavioural) or intention, although there are significant differences in their level of individual immersion. Therefore, it is a more complex profile for catching their interest, but there is room for manoeuvring if ES1_VR is used. In the case of individuals with an active cultural profile, experiences with high levels of immersion work better than those with low levels. These results support H5 and H6.

Finally, the relationship between intention and these three action variables was analysed: looking for more virtual/online experiences about this museum, learning more about the museum, and trying to visit the museum in person in the future. For this purpose, Pearson's correlation analysis between the intention and these three action variables was performed (see Table 11). According to Cohen (1988) and for the whole sample, the correlations between the intention and the search for more experiences and more information about the museum are strong and significant ($p = .796$ and $p = .566$, respectively); while the correlation between the intention and the visit to the museum in person in the future is moderate and significant ($p = .324$). Moreover, Student's t-test values indicate that there are mean differences in these three action variables depending on the cultural profile of the individual (Passive vs. Active). As expected, individuals in the Active cluster display higher levels in all variables. These results support H7.

To summarise, major findings of this work are presented in the following table (see Table 12).

5. Discussion

5.1. Theoretical and empirical contributions

This paper proposes an analysis of the effect of immersion of the experience on affective and conative performance in the context of museums for young people, which has not been studied yet in the literature. As evidenced in the study by Lee et al. (2020, p. 9) when they state that "research on the outcomes of immersive VR museum environments is still at an embryonic stage". Therefore, this study aims to contribute to this field by providing empirical evidence that can serve as a reference for future research in this area.

Firstly, it has been empirically demonstrated that immersion of the experience has a positive effect on affective performance, similar to the results obtained by Flavián et al. (2020) from the point of view of technological embodiment in the specific case of virtual tourism pre-experiences. As part of the affective performance, it was evidenced that the immersion of the experience has a positive effect on the immersion of the individual, i.e. the higher the technological level of the device used, the greater the immersion of the individual in the stimulus. Previous literature related to immersive experiences has focused either on the study of the immersion of the experience, for example, through technological embodiment (Flavián et al., 2019b, 2020), or on the study of the individual's immersion in a specific VR experience (e.g., Kim et al., 2020), but few studies have measured the relationship between

Table 5
MANCOVA results.

Effect	Wilks' Λ	F- Snedecor	D.f. Of the hypothesis	D.f. Of the error	Signif.	Partial eta squared	Observed power
Intercept	0.470	33.632	5	149	.000	0.560	1.000
Experimental Scenario	0.832	2.866	10	298	.002	0.088	0.974
Cultural Intensity	0.772	8.796	5	149	.000	0.228	1.000

Table 6
Differences among scenarios.

Constructs	Total (N = 157)		ES1_VR (N = 50)		ES2_MB + GL (N = 50)		ES3_VD (N = 57)		F	p	Tukey
	M	SD	M	SD	M	SD	M	SD			
IMM	5.65	1.14	6.17	0.90	5.64	1.13	5.24	1.20	9.072	.000	1–2 1–3
ENJ	6.22	0.98	6.59	0.67	6.08	1.17	6.02	0.95	5.643	.004	1–2 1–3
P_ENG	6.29	0.93	6.63	0.56	6.10	1.16	6.15	0.90	5.277	.006	1–2 1–3
B_ENG	6.09	1.02	6.43	0.79	6.07	1.04	5.82	1.12	5.061	.007	1–3
INT	5.37	1.31	5.86	1.21	5.18	1.30	5.11	1.29	5.522	.005	1–2 1–3

Table 7
Cluster centroids.

Indicators	Cluster 1 "Passive"	Cluster 2 "Active"	F	p
CI_1	4	5	22.858	.000
CI_2	3	4	38.220	.000
CI_3	3	6	155.622	.000
CI_4	3	5	167.433	.000
CI_5	4	6	65.986	.000
CI_6	5	6	12.890	.000
CI_7	3	6	64.707	.000
CI_8	6	7	24.332	.000
Cluster size	50 (31.85%)	107 (68.15%)		

Table 8
Differences among cultural profiles.

Constructs	Total (N = 157)		Passive (N = 50)		Active (N = 107)		t	p
	M	SD	M	SD	M	SD		
IMM	5.65	1.14	4.95	1.05	5.99	1.03	5.832	.000
ENJ	6.22	0.98	5.83	0.99	6.41	0.92	3.540	.001
P_ENG	6.29	0.93	5.98	0.95	6.43	0.90	2.879	.005
B_ENG	6.09	1.02	5.65	1.07	6.30	0.94	3.902	.000
INT	5.37	1.31	4.67	1.21	5.70	1.22	4.916	.000

both immersions, experience and individuals (i.e., Willems et al., 2019), and none in the context of museums. Another part of the affective performance analysed in this research was enjoyment, with the result that immersive experience has a positive effect on enjoyment, similar to the results obtained by Kim et al. (2020) in the context of virtual tourism experiences. Finally, psychological engagement was included as a construct of affective performance. The results showed that there is a positive effect of experiential immersion on psychological engagement. This relationship has been little studied empirically, with some exceptions demonstrating that embodied VR technologies had a positive impact on psychological engagement (e.g., Flavián et al., 2020). Furthermore, ES1_VR is the most immersive experience that generates the highest levels of all three affective performance constructs (individual immersion, enjoyment and psychological engagement).

Secondly, it has also been empirically demonstrated that immersion of the experience has a positive effect on conative performance, similar to what other authors have shown partially but not as a whole (e.g., Flavián et al., 2019b; Kim & Hall, 2019). As part of the conative performance, behavioural engagement was studied, which, as with psychological engagement, has been little addressed empirically in the literature (e.g., Flavián et al., 2020). The results obtained show that immersion of the experience has a positive effect on behavioural engagement. However, in this particular case, significant differences in behavioural engagement were only observed between the two extreme levels of immersion experience (ES1_VR versus ES3_VD). As mentioned before, limited number of studies in the literature that address the

Table 9
Differences among scenarios for Passive cluster.

Constructs	Total (N = 50)		ES1_VR (N = 14)		ES2_MB + GL (N = 14)		ES3_VD (N = 22)		F	p	Tukey
	M	SD	M	SD	M	SD	M	SD			
IMM	4.95	1.05	5.42	1.01	4.97	0.86	4.63	1.11	2.585	.086	1–3
ENJ	5.83	0.99	6.09	0.95	5.73	0.81	5.73	1.13	.637	.533	–
P_ENG	5.98	0.95	6.30	0.70	5.80	0.94	5.90	1.07	1.129	.332	–
B_ENG	5.65	1.07	5.86	1.03	5.81	0.94	5.41	1.16	.980	.383	–
INT	4.67	1.21	5.18	1.20	4.50	1.19	4.45	1.19	1.763	.183	–

Table 10
Differences among scenarios for the Active cluster.

Constructs	Total (N = 107)		ES1_VR (N = 36)		ES2_MB + GL (N = 36)		ES3_VD (N = 35)		F	p	Tukey
	M	SD	M	SD	M	SD	M	SD			
IMM	5.99	1.03	6.42	0.68	5.89	1.12	5.63	1.10	5.938	.004	1–2 1–3
ENJ	6.41	0.92	6.79	0.39	6.22	1.27	6.20	0.78	5.122	.008	1–2 1–3
P_ENG	6.43	0.90	6.76	0.45	6.22	1.23	6.31	0.74	4.005	.021	1–2 1–3
B_ENG	6.30	0.94	6.66	0.54	6.17	1.07	6.08	1.03	4.202	.018	1–2 1–3
INT	5.70	1.22	6.13	1.12	5.44	1.26	5.51	1.19	3.539	.033	1–2 1–3

Table 11
Correlation between intention and action variables. Mean difference in action among clusters.

Action Variables	Total			Passive		Active		t	p
	M	SD	p	M	SD	M	SD		
I would look for more online/virtual experiences about this museum	5.66	1.33	.796***	5.08	1.43	5.93	1.20	3.911	.000***
I would like to learn more about the museum	5.52	1.33	.566***	4.62	1.38	5.94	1.07	6.555	.000***
I would try to visit the museum in person in the future	6.22	1.23	.324***	5.34	1.61	6.64	.69	7.057	.000***

Note:***p-value ≤.01; **p-value ≤.05.

Table 12
Major findings.

Hypotheses	Results
H1. Immersion of experience has a positive effect on affective performance.	Empirically supported
H1a. Immersion of experience has a positive effect on the immersion of the individual.	Empirically supported
H1b. Immersion of experience has a positive effect on the enjoyment of the individual.	Empirically supported
H1c. Immersion of experience has a positive effect on the individual's psychological engagement.	Empirically supported
H2. Immersion of experience has a positive effect on conative performance.	Empirically supported
H2a. Immersion of experience has a positive effect on the individual's behavioural engagement.	Empirically supported
H2b. Immersion of experience has a positive effect on the intention of the individual.	Empirically supported
H3. Individuals with greater cultural intensity show higher levels of affective performance (immersion, enjoyment, and psychological engagement).	Empirically supported
H4. Individuals with greater cultural intensity show higher levels of conative performance (behavioural engagement and intention).	Empirically supported
H5. Individuals with an active cultural profile show increased affective performance (immersion, enjoyment, and psychological engagement) depending on the level of immersion of the experience.	Empirically supported
H6. Individuals with an active cultural profile show increasing conative performance (behavioural engagement and intention) depending on the level of immersion of the experience.	Empirically supported
H7. Individuals with an active cultural profile show a more proactive attitude of information search and visit intention.	Empirically supported

influence of immersion levels on behavioural engagement does not allow us to venture a precise explanation for this result. However, we believe that behavioural engagement, being a construct that involves recommendation to others, is strongly influenced by how the lived experience exceeds their expectations. In other words, for a participant to recommend an experience, it is necessary for the experience to significantly exceed their expectations. Therefore, we believe that the differences are only appreciable between the two extreme experimental scenarios (fully immersive and non-immersive). We must remember that recommendation is a behavioural manifestation of the user towards a given object that goes beyond action (van Doorn et al., 2010) and presupposes a strong conviction towards the object of study. Therefore, ES1_VR is the level of immersion of the experience that really turns the participant into a prescriber of the experience, with other levels of immersion failing to achieve this goal. The other construct studied as conative performance was intention. The results support that the higher the level of immersion of the experience, the greater the intention to repeat this type of experience or to search for similar experiences. Intention is one of the most studied constructs of conative performance since it is the step prior to an actual behaviour (e.g., Errichiello et al., 2019; Griffin et al., 2017; Tussyadiah et al., 2018). The study of intention linked to a participant's experience of similar experiences and not only to their future visit is a novel and less addressed approach in the literature of immersive experiences in the context of cultural tourism. These outcomes are therefore empirical evidence that can support hypotheses for similar studies in future research.

The study of the relationship between cultural intensity and the levels of affective and conative performances of individuals is a novel analysis in immersive experiences and necessary in the context of cultural activities such as museum visits. In addition to this theoretical and empirical contribution, the way of operationalizing cultural intensity from the AIO measurement scale can be considered as another theoretical contribution in the framework of measurement scales in the cultural sector. The results of the study indicate that higher levels of cultural intensity generate higher levels of affective and conative performances, so cultural intensity should be a variable to consider in the cultural behaviour of young people.

Furthermore, the results of the study show that the cultural profile of the participant influences the levels of affective and conative performances, as participants with an active cultural profile have higher levels of individual immersion, enjoyment, psychological engagement, engagement and affective performance. In addition, significant differences in affective and conative performance levels are also observed as a function of the level of immersion of the experience in individuals with an active cultural profile, with the highest scores being obtained in ES1_VR. Also, the results obtained by this research highlight the importance of taking into account the specific profile of the individual when immersive experiences are being used with stimulus from a very specific context, as is the case of museums. The results indicate that individuals with an active cultural profile show more interest in the search for information about the museum and in the intention to visit in the future. Therefore, in studies related to cultural activities, the cultural profile should be a factor to be considered as a possible moderating variable. These conclusions are an interesting contribution to the literature on immersive experiences in museums.

5.2. *Managerial implications*

The results obtained have led to the conclusion that with a higher level of immersion of experience, there is an overall impact on affective and conative performance among young people. This indicates that the higher the immersion level of the technology used to carry out the immersive experience, the greater affective and conative impact on the individual. Thus, those responsible for attracting young visitors to museums can expand and select the immersion systems according to their objectives. This requires the marketing plans of museums include differentiate strategies according to the age of its visitors. This could reduce the current sense of exclusion that many young people perceive when trying to approach museum exhibitions, which are designed based on a pattern that does not fit their vision of today's world (Gofman et al., 2011; Mason & Mccarthy, 2006), a pattern that is not able to exploit the advantages that interactivity implies for this market segment (Goulding, 2000). Therefore, ES1_VR will get the best results in terms of individual immersion, enjoyment, psychological engagement, behavioural engagement and intention. The results show that ES1_VR will always be the most effective, but those responsible for museum campaigns should choose not only the one that is most effective, but also the most efficient (in terms of time and money), since, at times, the increase in efficiency does not justify the increase in cost and the resources to be allocated. In this sense, when economic resources do not allow for the generation of a VR experience, the results indicate that the non-existence of differences

in affective and conative performances between ES2_MB + GL and ES3_VD recommend opting for ES3_VD, which is a much more efficient and equally effective alternative to ES2_MB + GL.

It has also been proven that the higher the level of immersion of experience, the greater the intention is to repeat this type of experience, thus opening a new creative strategy in the promotion of museum. The results support a strong commitment of the museum sector to VR experiences, as participants exposed to the virtual scenario expressed a clear intention to continue doing these virtual visits and to look for other similar virtual visits. In the same way, the results indicate that these participants could act as prescribers of these virtual experiences, given their high scores in behavioural engagement. Therefore, museum managers should use promotional campaigns to promote the creation of content by users of virtual experiences for sharing it on social media.

Moreover, the results related to the cultural profile show that those young people with a passive profile are very difficult to attract through immersive experiences. For this reason, it would be desirable for those responsible for marketing strategies to conduct a segmentation among young people, focusing their efforts on the group that has a more active cultural profile, for whom virtual experiences with greater immersion work better than those with less intensity. Despite this differentiation, it should be noted that all young people are interested in finding more experiences and learning more about the museum after having this virtual experience, also showing a moderate intention of visiting the museum in person in the future. This result opens new alternatives for attracting young people as future visitors of museum, since immersive experiences can really become an intention for visiting museums.

Finally, the results of this study open up new business opportunities that can help to diversify the traditional museum sector. On the one hand, museums could expand their offer by implementing or intensifying virtual tours of their most emblematic artworks, galleries, art periods or authors. With this initiative, the target audience would be extended to the general population and not only limited to the younger population, including both active and passive cultural profiles. In addition, this new strategy would also bring art closer to people with special needs that prevent them from visiting museums in person, as well as to people with lower purchasing power who cannot afford to visit museums. And on the other hand, museums could contribute to increase children's and young people's interest in art by designing immersive experiences adapted to different educational levels and disseminating them in schools, thus expanding the future potential market.

5.3. Limitations and future research lines

This paper is not without limitations, which are basically related with the study context (a particular museum), the experience used (Mona Lisa: Beyond the Glass), the geographical scope and the type of sampling (non-probabilistic by quotas). Given these limitations, it would be advisable to replicate this study for other museums, with other experiences, in other geographical scopes and in populations with other characteristics. These new works would allow validation of the results obtained in this research, as well as serve as justification for future research studies.

Additionally, another line of research could be to validate structural models of cognitive-affective-conative behaviour based on the SOR (Stimulus-Organism-Response) model considering as stimulus the level of immersion of the experience (head-mounted display-HDM-as fully immersive, mobile device and VR glasses as semi-immersive and computer screen as non-immersive), as organism the affective performance and as response the conative performance. Under this same future line of research, it would be ideal to analyse the effect of variables such as cultural intensity, cultural profile, previous experience as a museum visitor, past visit to the museum under analysis, intellectual curiosity, technological profile and sociodemographic characteristics on these behavioural models.

Finally, it could be of interest to add the use of neuromarketing techniques to incorporate variables related to the attention paid by participants and their reaction to the stimulus used, using non-declarative measures from neurophysiological techniques, such as Eye-Tracking or EEG.

Credit author statement

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