European Journal of Business and Management
ISSN 2222-1905 (Paper) ISSN 2222-2839 (Online)
Vol.17, No.5, 2025

The impact of immersive virtual reality tour on mental imagery and visit intention

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Abstract

In a context where immersive technologies are experiencing considerable growth in the tourism sector, virtual reality appears to be a promising tool for enhancing the appeal of destinations. However, the actual effectiveness of these immersive visits remains to be documented, particularly with regard to their ability to stimulate mental imagery and the intention to (re)visit. This study aims to investigate whether immersive VR visit increases mental imagery and intention to (re)visit compared to non-immersive VR visit, integrating prior experience with the destination as a moderator. A laboratory experiment was conducted with 308 students. Data were collected before and after the immersive VR visit of Makthar Museum (Tunisia) and compared to control condition (non-immersive). The study had mixed effects, with the VR visit (immersive vs. non-immersive) as a between-subjects factor and time (before and after) as a within-subjects factor. Results showed that immersive VR visit (vs. non immersive) increase significantly mental imagery, which in turn positively influences (re)visit intention. Moreover, this study revealed that immersive VR visit is an effective strategy only for participants without prior experience of the destination.

Keywords: Immersive VR, Tourist destination, Mental imagery, Visit intention, Prior experience.
DOI: 10.7176/EJBM/17-5-03
Publication date: June 30th 2025

1. Introduction

Technological innovations continue to significantly transform the tourism sector and destination promotion (Wei et al., 2019). Among information and communication technologies (ICTs), virtual reality (VR) stands out for its rapid growth and far-reaching effects (Prodan & Egresi, 2023). It is considered one of the most important

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technological advances in tourism sector, due to its ability to engage consumers and effectively promote tourist destinations (Tussyadiah et al., 2018; Bogicevic et al., 2019). Thus, virtual reality (VR) technology allows tourism consumers to experience a destination before physically visiting it (Israel et al., 2019). Moreover, the integration of VR in the tourism sector offers users the opportunity to immerse themselves in a virtual environment, giving potential tourists a preview of their future trip through virtual tours, and thus allowing future travelers to discover the destination from a distance (Neuhofer et al., 2014). In addition to offering potential tourists a virtual representation of the destination and supplementary information, virtual reality (VR) technologies have the potential to provide users with an immersive, interactive, engaging, and enjoyable experience (Fan et al., 2022). It has been demonstrated in numerous studies that VR is a more effective method for destination marketing than traditional techniques such as printed brochures (Moura et al., 2017). As a result, an increasing number of hospitality establishments, cultural institutions, and travel agencies have begun to adopt virtual tours as a component of their marketing strategy (Jung et al., 2016; Griffin et al., 2017; Bogicevic et al., 2019; Wei et al., 2019).

Although the literature on the use of VR in the field of tourism marketing has continued to grow (Zeng et al., 2020; Prodan & Egresi, 2023), it remains relatively scarce and fragmented (Moorhouse et al 2018; Verma et al., 2022). Furthermore, although there is evidence that immersive VR can increase mental imagery and visit intent (Jung et al., 2016; Tussyadiah et al., 2018; Kim et al., 2020; Zeng et al., 2020; Skard et al., 2021; Ouerghemmi et al, 2023), most of these studies remain very general (Prodan & Egresi, 2023) and to our knowledge rarely make useful recommendations for individuals that are not positively influenced by the virtual destination visit. Moreover, research into the impact of immersive VR visit on mental imagery and intention to visit is, to our knowledge, rare, especially in the context of domestic tourism, despite its important economic impacts. Thus, in contrast to international tourism, the use of immersive VR as a promotional tool for domestic tourism is still largely insufficiently studied (Ouerghemmi et al., 2023). In addition, the implementation of a marketing strategy based on VR is not devoid of potential risks and challenges. For instance, research conducted by Tussyadiah et al. (2018) has highlighted some doubts concerning the actual impact of VR on tourism destination marketing. This can be partly explained by the lack of knowledge among tourism marketers on how to effectively use VR technology to influence potential customers' travel decisions (Moorhouse et al., 2018), as well as by the fact that research on the boundary conditions for the effectiveness of immersive VR in the tourism context is still limited (Skard et al., 2021). Thus, it is very probable that the effectiveness of immersive VR visit depends on the level of individuals' prior experience with the destination.

Therefore, the present research aims to investigate the effect of immersive VR visit (vs. non-immersive) on mental imagery and intention to visit or revisit the destination, incorporating prior experience with the destination as a moderator. This article aims to answer the following research questions:

- Does an immersive VR visit increase mental imagery?
- Does an immersive VR visit increase intention to visit or revisit a destination?
- To what extent does prior destination experience affect the relationship between immersive (vs. non-immersive) VR visit and mental imagery?

The architecture of this work is as follows. In the first section, we briefly review the research conducted on immersive VR and tourism. The second section presents the impact of immersive VR on mental imagery and visit intention, as well as the role played by prior experience with the destination in the relationship between the VR visit and mental imagery. In the third section, the methodological framework and the specific destination used in the experimental survey are described. The final section focuses on the main results. We conclude with a discussion of the main findings, which will be used to conclude this article and show how these findings can be used in practice for managerial purposes and applications.

2. Literature review and development of research hypotheses

2.1 Virtual reality and tourism

As an advanced and versatile technology, virtual reality (VR) has gained in popularity over the last decade due to advances in information and communication technologies (Arias et al., 2020). It is considered as a computer-generated interactive environment that simulates the physical world through realistic scenarios, thereby enabling users to interact with objects and experience a sense of presence (Tussyadiah et al., 2018). In this sense, VR is defined as "the use of a computer-generated 3D [three-dimensional] environment – called a 'virtual environment' […] resulting in real-time simulation of one or more of the user's five senses" (Guttentag, 2010). Virtual environments adjust according to the user's interactions and movements, enabling the user to create vivid mental images of the environment, reinforcing the illusion of "being there" and fostering total immersion in the virtual world (Tussyadiah et al., 2018).

VR is increasingly used in the tourism industry to enrich the visitor experience, offer virtual tours and optimize marketing efforts (Ouerghemmi et al., 2023). Thus, VR applications have the ability to transform the way tourists discover destinations (Verma et al., 2022; de Lurdes Calisto & Sarkar, 2024). The latest research indicates that VR has the potential to significantly enhance the tourist experience (Flavián et al., 2021) and act as an innovative marketing communication tool (Kim et al., 2020; Skard et al., 2021). As such, it has become an essential tool in destination marketing due to its ability to provide potential tourists with a realistic overview of destinations (Prodan & Egresi, 2023). According to Beck et al. (2019), VR allows users to experience interactive simulations of tourist destinations, transcending physical and temporal boundaries. Thus, by simulating virtual visits, VR can captivate travelers even before they arrive, stimulating their curiosity and desire for real exploration (Guttentag, 2010). In addition, VR can enhance the visitor experience by offering virtual tours that are both educational and engaging (Han et al., 2018; Griffin & Muldoon, 2022). Studies have shown that VR can significantly improve a destination's image and influence tourists' visit and travel intentions (Moura et al. 2017; Tussyadiah et al., 2018; Marasco et al., 2018; Sun et al., 2025). For example, Moura et al. (2017) pointed out that, compared to brochures and websites, VR generates higher travel intentions. Yeh et al. (2017) also found that virtual reality, compared to 2D images, attracts tourists more to a destination, inciting them to visit or revisit it. In addition, Cowan and Ketron (2019) have demonstrated that the VR experience is unique and better than that offered by 2D environments.

Virtual tours can be experienced through both immersive and non-immersive virtual reality devices (Alyahya & McLean, 2022). For example, immersive virtual reality headsets such as HMD headsets enable tourism

consumers to experience a virtual environment in an immersive way, giving them the feeling of actually being part of the experience (Wei et al., 2019). The HMD (head-mounted display) is a highly immersive system that provides total isolation from the physical world (Guttentag, 2010). This technology aims to provide an immersive experience for customers (Huang et al., 2016; Flavián et al., 2019; Nouri et al., 2025), focused on pleasure and sharing (Rauschnabel & Ro, 2016), in order to elicit positive emotions towards the destination (Griffin et al., 2017) and engage tourists (Sun et al., 2025). By offering immersive previews, VR helps potential visitors make more informed travel decisions, potentially increasing their satisfaction and probability of recommending the destination to others (Prodan & Egresi, 2023). These tours can also offer users a realistic, immersive experience that may increase their satisfaction and intention to visit the physical location (Kim et al., 2019; Nguyen et al., 2023). Furthermore, users have the possibility of viewing virtual reality content, such as 360° images or videos, without the need to wear an HMD headset. They can do so in a less immersive environment by manipulating or rotating the device on which the content is displayed, such as a PC, smartphone or tablet (Beck et al., 2019; Bogicevic et al., 2019).

2.2 The impact of immersive VR on mental imagery and visit intent

The concept of mental imagery is defined as "a processing mode in which multisensory information is represented in a gestalt form in working memory" (MacInnis & Price, 1987). In the domain of tourism, VR plays a crucial role in facilitating the creation of mental images of the characteristics of a destination. Indeed, VR has the ability to make the tourism experience tangible and concrete (Nicoletta & Servidio, 2012). According to Tussyadiah et al. (2018), the use of VR allows the individual to develop vivid mental representations of the virtual world, thus reinforcing the illusion of being truly immersed in this virtual environment. These dynamic mental images generated by VR offer individuals the opportunity to interact with the virtual environment (Saunders et al., 2011). In addition, they allow tourists to visualise and anticipate their future experiences (Yoo & Kim, 2014). Sussman and Vanhegan (2000) demonstrated that utilizing VR tools to explore destinations prompts individuals to plan their trips. Additionally, VR proves to be an influential tool in significantly heightening intentions to visit (Moura et al., 2017). Similarly, Jung et al. (2016) discovered that positive technological encounters during museum visits fostered favorable intentions to visit. Griffin et al. (2017) have shown that VR positively affects users' intention to visit, surpassing the effects of 2D videos and websites. Thus, this technology elicits more robust visit intentions than other forms of communication (Jung et al., 2016; Moura et al., 2017; Sun et al., 2025). Similarly, Yeh et al. (2017) and Lee et al. (2020) reported that VR allows potential tourists to feel the atmosphere of a destination before visiting, thus increasing their visit intention. Furthermore, according to Zeng et al. (2020), VR promotes increased mental imagery of the destination, thus reinforcing travel intentions. Skard et al. (2021) suggested that the immersive experience of VR leads to high levels of mental imagery, thus stimulating a favorable intention to visit. More recently, studies such as those conducted by Ouerghemmi et al. (2023), Hoang et al. (2023), and Morrison et al. (2024) have also highlighted that VR can significantly increase individuals' intention to visit and travel. Based on these arguments, the following hypotheses are formulated:

H1: The immersive VR visit increases participants' mental imagery more than the non-immersive VR visit.

H2: The immersive VR visit increases participants' intention to (re)visit more than the non-immersive VR visit.

2.3 The role of mental imagery

Mental imagery is considered a central element capable of predicting behavioral intentions (Skard et al., 2021) as well as behavioral outcomes (Lee & Gretzel, 2012). Lee and Gretzel (2012) found that visual stimuli on a tourist destination website elicit mental imagery that positively influences visitor behavior through attitudes. Similarly, Yoo and Kim (2014) highlighted the importance of mental imagery in the influence of online product presentation on revisit and purchase intention. Gavilan et al. (2014) also showed that mental imagery can trigger positive purchase intention. In the context of virtual experiences, some studies have shown that VR fosters the creation of mental images of a destination (Jung et al., 2016; Bogicevic et al., 2019; Wei et al., 2019), which increases users' intention to visit (Disztinger et al., 2017; Tussyadiah et al., 2018; Kim et al., 2020). These studies have revealed that the immersive environments offered by VR allow users to mentally project themselves into the destination, thus reinforcing their desire to visit. This clearly shows that mental imagery, facilitated by immersive technologies, plays a key role in shaping behavioral intentions and can be an effective lever for marketing strategies in the tourism sector. Recently, Ouerghemmi et al. (2023) demonstrated that mental imagery has a positive impact on tourists' visit intentions and acts as a mediator in the relationship between telepresence and visit intentions. In the same vein, Skard et al. (2021) showed that VR (vs. 2D) has a positive impact on behavioral intentions and that mental imagery mediates this relationship. Based on the discussions above, we propose the following hypotheses:

H3: Mental imagery positively influences the intention to (re)visit the tourist destination.
H4: Mental imagery mediates the relationship between immersive VR visit (vs. non-immersive) and intention to (re)visit the tourist destination.

2.4 The moderating role of prior experience with the destination

In this study, we anticipate that the effect of the immersive VR visit (vs. non-immersive) on mental imagery will be moderated by users' prior experience with the destination. Indeed, perceptions of images of the destination vary depending on whether individuals have already visited it or are considering visiting it in the near future (Hughes, 2008; Skard et al., 2021). Thus, limited prior knowledge of the object presented allows novel mental imagery to emerge following exposure to VR, subsequently shaping consumers' perceptions and affective forecasting (Skard et al., 2021). In other words, when individuals have little or no prior knowledge of the destination presented, the immersive VR experience can generate more mental imagery. This novel mental imagery is a direct result of the immersive interaction. This immersion can stimulate their imagination, leading them to form clearer, more detailed mental representations of the destination, which might be less likely with non-immersive exposure. This underlines the importance of VR as a powerful tool for influencing consumers' mental imagery, especially when their initial knowledge of the destination is limited. On the other hand, for those with more experience, they may associate the virtual environment with the real one (Fan et al., 2022), so VR images might be contrasted with their actual experiences of the destinations, resulting in less stimulation (Skard et al., 2021). Consequently, attempting to replicate real-life experiences in VR may involuntarily result in a negative contrast effect for people who have already visited the destination, while it may have a positive effect on those with no prior experience. Individuals with no prior experience are more likely to be impressed by the

immersion and detail offered by VR. On the other hand, those with direct experience of the destination might compare the virtual experience with their memories, which could lead to a less favorable perception if the virtual visit doesn't match their expectations. As attitudes formed by direct experience are generally more solid and rooted than those generated by indirect experience, and are therefore potentially more resistant to counter-arguments (Rajagopal & Montgomery, 2011). Additionally, experienced consumers, when interacting with virtual reality (VR) content, may be less focused on specific destination features as they integrate a broader range of past experiences (Buehler & McFarland, 2001). Consequently, their expectations regarding the affective effects of future interactions with the product in question may be tempered (Buehler & McFarland, 2001), and their mental representations generated by VR will be influenced by their prior experiences. Furthermore, consumers who already have direct experience of the destination likely have already formed mental images based on these experiences, making them less likely to be influenced by VR content of a well-known destination (Skard et al., 2021). Skard et al. (2021) found that participants with low prior experience of destinations tended to report higher levels of behavioral intentions when exposed to VR images compared to 2D images. These authors also suggested that VR can induce different mental processes depending on the level of users' prior experience with the destination. Recently, Fan et al. (2022) found that prior visit negatively moderates the effect of presence on virtual reality experience. Therefore, it is likely that, compared to consumers with prior experience of the destination, consumers without prior experience will be more strongly influenced by an immersive VR visit. Based on this argument, our hypothesis is as follows:

H5: Immersive VR visit (vs. non-immersive visit) has a positive effect on the intention to (re)visit the destination via mental imagery, but this effect is stronger for participants with no prior experience of the destination than for those with prior experience of the destination.

Based on the above hypotheses, Figure 1 presents the conceptual framework proposed for this study.

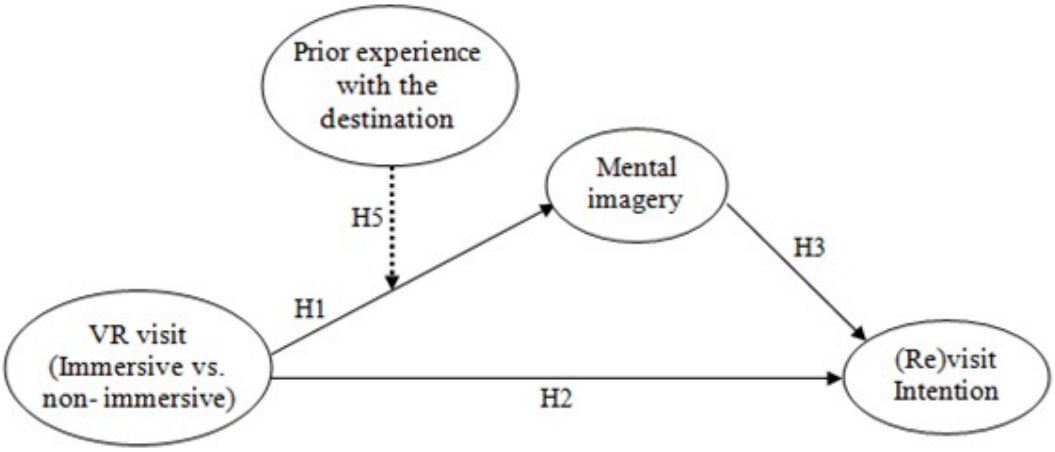

Figure 1: Conceptual model

3. Research methodology

3.1 Design and procedure

Given that the objective of this study is to examine the effect of immersive VR visit (versus non-immersive visit) on mental imagery and intention to (re)visit the destination, a 360° promotional video of the city of Makthar and its monuments was used. Specifically, this video shows a virtual tour of the Makthar Museum lasting 4 minutes and 12 seconds. We chose this destination due to its historical, architectural, and cultural richness, and also because the video indirectly invites participants to visit the city and its monuments by capturing their attention and stimulating curiosity.

In order to test our research hypotheses, a laboratory experiment was carried out. This experiment used a between-subjects design consisting of the manipulation of the degree of immersion in the 360° video (immersive vs. non-immersive) of the visit to the Makthar Museum, measuring all variables (with the exception of prior experience with the destination) before and after exposure to each experimental condition. The experiment was conducted in person and students were invited individually to the laboratory (each session included only one participant). Upon arrival, they were welcomed and informed that their responses would remain confidential and anonymous, in order to ensure the validity of the data collected. They were then invited to take an initial evaluation of their level of mental imagery and intention to (re)visit the Makthar Museum before being exposed to the 360° video, whether immersive or non-immersive. Participants were then randomly assigned to one of the two experimental conditions. Participants assigned to the immersive condition used an HMD headset (Samsung Gear VR), into which a Smartphone (Samsung Galaxy S9) was inserted to broadcast the 360° video. Alternatively, participants assigned to the non-immersive condition used a desktop (Dell) to watch the 360° video of the virtual tour of the Makthar Museum. Participants were informed that they could discontinue the experiment if they experienced motion sickness or any other symptoms at any point during the experiment. After viewing the 360° video (immersive or non-immersive), participants were asked to indicate their level of mental imagery and intention to (re)visit, as well as their prior experience with the destination. Finally, they were thanked for their participation and informed of the possibility of receiving the results of the study if they so requested once it was completed.

3.2 Participants

The participants were students from a public university in Tunisia. They were recruited via a notice posted on the university's online platforms (website and Facebook), inviting students to take part in a ‘virtual visit to the Makthar Museum’ in exchange for monetary compensation. Those who agreed to participate in our study were given instructions on how to take part in the virtual visit. We chose a sample of students for several reasons. First, our study aims to examine the effect of immersive VR visit (vs. non-immersive VR visit) on mental imagery and (re)visit intention. Previous research (Wang and Yang, 2008) has shown that, despite different demographic profiles, student and non-student participants exhibit similar behavioral patterns. Second, given that our study required the use of VR devices, we preferred to conduct a laboratory experiment to ensure high internal validity, even if this meant sacrificing some of the external validity usually provided by field experiments (Ying et al., 2021). By taking advantage of the relative homogeneity of the student groups, we were able to enhance control and internal validity (Thomas, 2011). Furthermore, Boland (2017) suggests that

individuals aged 18-34 are most interested in VR technology, making students an appropriate sample to represent potential VR users viewing promotional videos of tourist destinations. Overall, the use of a student sample is justified (Viglia and Dolnicar, 2020).

3.3 Measures

To measure the variables in our study, we used scales taken from the literature and adapted to the tourism context. Mental imagery and intention to revisit are assessed before and after exposure to each experimental condition, while prior experience of the destination is measured only after exposure.

Mental imagery was measured using a 3-item Likert scale (1 “not at all” to 7 “to a high degree”) adapted from Schlosser (2003) and Lee et al. (2012). Intention to (re)visit the destination was measured using a 3-item Likert scale (1 = Strongly disagree; 7 = Strongly agree) developed by Jung et al. (2016), which has been validated and adopted in the tourism context (Ying et al., 2021). Given that the scales measuring mental imagery and intention to (re)visit were administered before and after the VR intervention, it is important to note that some minor adjustments were made to these two scales before the VR intervention, in order to establish a "before-after" comparison. All items are presented in Table 1.

In line with the approach adopted in previous studies, such as Rasoolimanesh et al. (2021) and Gabbioneta and De Carlo (2018), for the measurement of previous experience with the destination we asked each respondent to indicate whether they had ever visited the destination (Makthar Archaeological Site and Museum) or not. The variable is coded 1 if the respondent has visited the destination at least once and 0 if they have never visited the destination. All these scales have been tested and validated in the context of tourism.

Moreover, participants' general information, such as age, gender, frequency of travel for tourism and prior VR experience, is collected and used as control variables. The prior VR experience was evaluated utilizing the scale devised by Shen et al. (2020), which inquired about participants' prior use of a VR headset, categorized into four levels of usage: Never, Once, Several Times (2 to 5 times), and Often (more than 5 times). The research questionnaire also included a manipulation check question, formulated using a single item developed by Barnidge et al. (2022): “How immersive do you feel the video was?” (1 = not very immersive; 7 = very immersive).

Table 1: Measures

	Items	Sources
Mental imagery		
MI1	To what extent did the video bring to mind mental images of the destinations?	Lee et al. (2012)
MI2	To what extent did the video contain information that helped you imagine a trip to these destinations?	
MI3	To what extent did the video help you visualize a trip to these destinations?	
Intention to (re)visite		
IV1	I am planning to (re)visit Makthar Museum that I observed in the VR commercial.	Jung et al. (2016)
IV2	I intend to (re)visit Makthar Museum that I saw in the VR commercial in the near future.	
IV3	I am willing to (re)visit Makthar Museum that I saw in VR commercials soon.	

4. Results

4.1 Demographic profile

314 students took part in the experiment, but 6 participants were excluded. Four of them dropped out of the study due to motion sickness or cybersickness, while the other two were removed due to numerous missing answers in the questionnaire or their inconsistency. This resulted in a final sample of 308 students.

The characteristics of respondents are detailed in Table 2. The sample was made up of more women (n=175; 56.8%) than men (n = 133; 43.2%). The average age of the participants was 25.93 years, ranging from 19 to 34 years. 47.4% of participants travel for tourism purposes once a year, 33.4% travel twice, and 14.3% travel more than twice , whereas, 4.9% no travel for tourism purposes. For prior VR headset experience, 33.8% of participants indicated having no previous experience with VR headset, followed by those who had used it once (30.2%). Whereas, 19.4% of participants reported having used it several times, and finally, only 16.6% used it often. Finally, 73.4% of participants said they had no prior direct experience with the destination, while 26.6% said they did. Thus, 73.4% of the sample are classified as "participants without prior experience of the destination" and 26.6% as "participants with prior experience of the destination". This dichotomy is used as a moderator to test hypothesis H5.

Table 2: Respondents profile

		Frenquency	Percentage
Gender			
	Men	133	43.2
	Women	175	56.8
Travel for tourism purposes			
	No travel	15	4.9
	Once a year	146	47.4
	Twice a year	103	33.4
	More than twice a year	44	14.3
Previous experience with VR			
	Never	104	33.8
	Once	93	30.2
	Several times	60	19.4
	Often	51	16.6
Prior experience with the destination			
	Without	226	73.4
	With	82	26.6
Age		**Mean**	**Range**
		25.93	19-34 years

4.2 Manipulation Check and control measures

The manipulation of the degree of immersion of the 360° video was verified using an independent t-test analysis. The results show a significant difference between the two groups ($t = -12.149$, $p < 0.01$). Specifically, participants who used an HMD headset found the video more immersive ($M_{HMD\ VR} = 3.68$) compared to those who viewed a pre-recorded version of the video on a desktop ($M_{Desktop\ VR} = 2.19$). Consequently, the degree of immersion of the 360° video differed significantly between the two groups.

In addition, to ensure that the differences between the two groups were attributable to the manipulation of the degree of immersion of the video (Immersive vs. non immersive), and not to other factors such as demographic characteristics, frequency of travel for tourism purposes or previous experience with VR headsets, control measures were implemented. Specifically, independent samples t-tests and chi-square analyses were performed. The results show a significant difference between the two groups in terms of previous experience with VR headsets ($t = 2.450$; $p<0.05$). However, no significant differences were found between the two groups in terms of age ($t = -1.625$; $p>0.05$), gender ($X^2 = 0.648$; $p>0.05$) and frequency of travel for tourism purposes ($t = -1.583$; $p>0.05$). We included previous experience with VR headsets as a covariate in the hypothesis testing analyses.

4.3 Exploratory and confirmatory factor analyses

In the present study, all the concepts were evaluated in terms of reliability and validity. The results obtained, which are presented in Table 3, show that the standardized item loadings vary between 0.797 and 0.869, thus exceeding the recommended threshold of 0.60 (Kline, 2005). In addition, the critical ratio of all the items is greater than 1.96 and the AVE of each concept exceed the threshold value of 0.50 (Fornell and Larcker, 1981). The composite reliability and Cronbach's alpha of the concepts ranged respectively between 0.879 and 0.886, and between 0.885 and 0.890, both above the acceptable value of 0.7 (Hair et al., 2010). These results confirm the good validity and reliability of all the scales used.

Table 3: Results of exploratory and confirmatory factor analyzes

	Std. Estimate	CR	AVE	Cronbach Alpha
Mental imagery		0.879	0.708	0.890
MI1	0.797			
MI2	0.860			
MI3	0.865			
Intention to (re)visite		0.886	0.721	0.885
VI1	0.869			
VI2	0.824			
VI3	0.853			

4.4 Hypothesis testing

Before testing H1 and H2, it is important to remember that the study uses a between-subjects design measuring mental imagery and intention to (re)visit the destination before and after the VR intervention (HMD vs. Desktop).

To evaluate the effect of the immersive VR visit (vs. non-immersive VR visit) on mental imagery and intention to (re)visit the destination, two mixed-model ANOVA analyses were conducted. The models included the following predictors: VR visit (with two levels: non-immersive vs. immersive, coded 0 and 1 respectively), time (with two levels: before and after exposure), and their interaction. VR visit (non-immersive vs. immersive) was included in these analyses as a between-subjects factor and time (before and after) as a within-subjects factor. These models make it possible to examine whether immersive visit, compared with non-immersive visit, improve mental imagery and the intention to (re)visit the destination.

The results obtained from the first analysis, presented in table 4, show the presence of a significant main effect of the immersive visit in VR (vs. non-immersive visit) on mental imagery. Thus, compared to the non-immersive VR visit (desktop), immersive VR visit (HMD) led to a higher level of mental imagery ($M_{HMD\ VR}$ = 4.36 vs. ($M_{Desktop}$ = 3.93; F (1; 306) = 24.981, p=.000<.01, Eta²=.076). Similarly, the main effect of time (before vs. after) on mental imagery was significant. Participants reported higher levels of mental imagery after the virtual visit of the destination than before ($M_{After\ VR\ intervention}$ = 4.57 vs. $M_{Before\ VR\ intervention}$ = 3.72; F (1; 306) = 7.425, p=.007, Eta²=.024). Moreover, the results revealed the existence of a significant interaction effect between the immersive VR visit (vs. non-immersive) and time (before vs. after) on mental imagery (F (1; 305) = 44.644, p=.000, Eta²=.128). We examine this interaction using two simple-effects t-test analyses per group. The results, detailed in Table 5, revealed the presence of a significant difference in participants' mental imagery before and after the immersive VR visit, where participants reported higher levels of mental imagery after the immersive VR visit than before ($M_{After\ immersive\ VR\ visit}$ = 5.08 vs. $M_{Before\ immersive\ VR\ visit}$=3.62; $t_{Immersive\ VR\ visit}$ = -10.616, p < .01), while no significant difference was found in participants' mental imagery before and after non-immersive VR visit ($t_{Non-immersive\ VR\ visit}$=-1.585, p>.05). These results indicate that mental imagery increased significantly for immersive VR visit (HMD VR), whereas this was not the case for non-immersive VR visit. Hence, *H1* was accepted. Of note, the covariate previous experience with VR headsets had no effect here (p>0.05).

Table 4: Descriptive analyses

			Dependent variables							
			Mental imagery				Intention to (re)visit			
			M	F	p	Eta²	M	F	p	Eta²
VR visit	Non immersive		3.93	24.981	.000	.076	3.94	.817	.367	.003
	Immersive		4.36				4.04			
Time	Before		3.72	7.425	.007	.024	3.86	4.399	.037	.014
	After		4.57				4.12			
VR visit * Time	Before	Non immersive	3.82	44.644	.000	.128	3.83	.153	.696	.001
		Immersive	3.62				3.89			
	After	Non immersive	4.02				4.03			
		Immersive	5.12				4.21			

Table 5: Simple effects t-tests by group for mental imagery

		Dependent variable : Mental imagery			
VR visit	**Time**	**M**	**t**	**ddl**	**p**
Immersive	Before	3.62	-10.616	306	.000
	After	5.08			
Non immersive	Before	3.82	-1.585	306	.114
	After	4.03			

The results obtained from the second analysis, presented in table 4, show the presence of a significant main effect of time on intention to (re)visit ($F (1, 306) = 4.399$, $p < .05$, $Eta^2 = .014$), indicating that participants' intention to revisit changed significantly between before and after the VR visit. However, the effect of immersive VR visit (vs. non-immersive VR visit) on intention to (re)visit is not significant ($F (1, 306) = .817$, $p > .05$, $Eta^2 = .003$), suggesting that the type of VR visit (immersive vs. non immersive) had no differential impact on intention to (re)visit. Furthermore, the results revealed no significant interaction between VR visit (immersive vs. non immersive) and time on intention to (re)visit ($F (1, 305) = .153$, $p > .05$, $Eta^2 = .001$), implying that changes in intention to (re)visit over time were similar for both VR visit types (immersive vs. non immersive). Therefore, H2 was not accepted. These results could indicate that visits in VR, whether immersive or non-immersive, are not sufficient to significantly modify individuals' (re)visit intentions. The immersive VR visit alone does not guarantee a change in intention to (re)visit the tourist destination. Consequently, it is possible that other factors, such as the characteristics of the sample, the context of the experience, and the participants' prior expectations, could play a crucial role in influencing (re)visit intentions.

To test hypotheses H3, H4 and H5, a moderated mediation analysis was carried out using the Macro PROCESS model 7 method (Hayes, 2013), with 5000 bootstrap. VR visit (non-immersive or immersive, coded 0 and 1 respectively) was assumed to influence mental imagery, which in turn should positively influence (re)visit intention (H3). Prior experience with the destination (Without prior experience of the destination vs. with prior experience of the destination, coded 0 and 1 respectively) was used as a moderator of the effect of immersive VR visit (vs. non-immersive) on mental imagery. Consequently, the conditional effects of the immersive VR visit (vs. non-immersive) on intention to (re)visit through mental imagery were calculated as a function of the moderator values corresponding to the presence or absence of a prior direct experience with the destination.

The results obtained, presented in Figure 2, revealed that the direct effect of immersive VR visit (vs. non-immersive) on mental imagery is significant (β = 0.78; p < 0.001, 95% CI=0.52; 1.05). Mental imagery, in turn, has a significant and positive impact on (re)visit intention (β = 0.47, p< 0.001, 95% CI=0.32; 0.63), supporting *H3*. This indicates that a strong, positive mental image can increase the probability that participants will want to visit or revisit a destination. Nevertheless, the direct effect of immersive VR visit (vs. non-immersive) on the intention to (re)visit was not significant (β = -0.37; p > 0.05, 95% CI=-0.77; 0.03), indicating that immersion alone is not enough to stimulate this intention. The results further revealed the presence of a significant negative interaction between immersive VR visit (vs. non-immersive) and prior experience with the destination (X*W = -1.13; p< 0.001, 95% CI=-1.75; -0.51). More specifically, a significant and positive indirect effect of immersive VR visit (compared to non-immersive visit) on intention to (re)visit via mental imagery was only found for participants with no prior experience of the destination (β = 0.37; 95% CI= 0.21; 0.55), but not for participants with prior experience of the destination (β = -0.16; 95% CI= -0.39; 0.02). In other words, immersive VR is more effective in influencing the visit intentions of new tourists than those who have already visited the destination. Consequently, hypotheses *H4* and *H5* are accepted. The overall moderate mediation model was supported by the moderate mediation index = -0.53, 95% CI= -0.84; -0.27). Of note, the covariate previous experience with VR headsets had no effect (p>0.05). Overall, these results indicate that (re)visit intention indirectly depends on immersive VR visit (vs. non-immersive) and prior experience with the destination through the mediating effect of mental imagery.

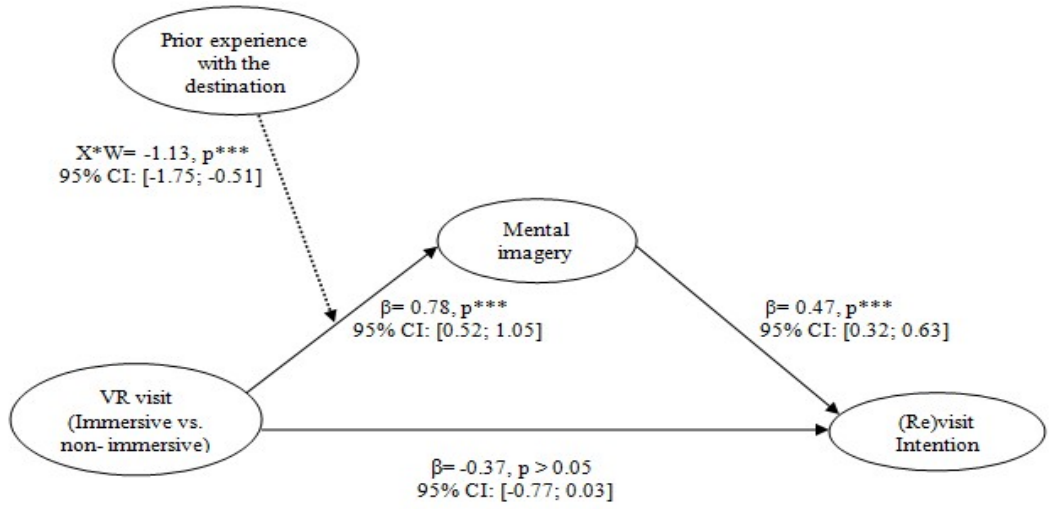

Figure 2: Moderated mediation analysis

5. Discussion

Our study examined the effect of an immersive VR visit (vs. a non-immersive visit) on mental imagery and intention to (re)visit the destination. The results show that immersive VR visit generates higher levels of mental imagery than non-immersive VR visit. This result is consistent with studies by Zeng et al. (2020) and Skard et al. (2021), which have shown that VR can generate high levels of mental imagery. However, our results indicate that there is no significant difference between (re)visit intention after an immersive VR visit and a non-immersive visit. This result contrasts with previous studies (Tussyadiah et al., 2018; Kim et al., 2020; Zeng et al., 2020; Ouerghemmi et al., 2023) that have suggested that VR can increase visit intentions. This divergence could be explained by the specific context of our study, namely the Tunisian context, as well as by the characteristics of our sample. Culturally, Tunisia presents a dynamic where the adoption of new technologies, such as VR, may be less rapid or integrated compared to other more technologically advanced contexts. Tunisians' preferences for leisure and tourism may also influence their receptivity to VR, potentially favoring physical experiences and direct human interaction. In addition, the limited familiarity with VR among our sample may have mitigated its expected effect on (re)visit intentions, contrasting with previous studies conducted in contexts where the technology is more widely accepted and used. Similarly, the characteristics of the sample include aspects such as preferred destinations and previous experience with the tourist destination, which can vary from one population to another, thus influencing participants' reactions to immersive videos and their (re)visit intentions. For example, in this study, participants viewed a 360° video of the Makthar museum. It therefore seems plausible that people with prior experience of this destination were not as positively influenced by VR as those with no prior experience. In fact, the lack of prior knowledge about the subject presented allows new mental imagery to emerge from exposure to VR, thus influencing consumers' perceptions and affective predictions (Skard et al., 2021). For those who had already visited the destination, the virtual visit may have compared unfavorably with real experiences. Thus, the attempt to mimic real-life experiences in VR may have generated a negative contrast effect for experienced participants (Skard et al., 2021). This explanation is supported by the results of the moderated mediation analysis, which show that a positive indirect effect of the immersive VR visit (compared to non-immersive visit) on (re)visit intention via mental imagery was only found for participants with no prior experience of the destination.

Furthermore, in line with the results of Ouerghemmi et al.'s (2023) study which showed that mental imagery positively influences visit intention, our results reveal that mental imagery positively influences (re)visit intention. Finally, the results of the moderation analysis show that prior experience with the destination moderates the effect of immersive VR visit (vs. non-immersive) on mental imagery, which is similar to the results of previous studies, such as Skard et al. (2021) and Fan et al. (2022). Thus, Skard et al. (2021) suggested that VR can induce different mental processes depending on the level of participants' prior experience with the destination. Similarly, Fan et al. (2022) found that prior visit negatively moderated the effect of presence on virtual reality experience.

5.1 Theoretical and managerial implications

Results of this study constitute a solid basis for suggesting several implications. Firstly, most research on mental imagery focuses on its effect on memorization (Bellezza et al., 2001; Schlosser, 2006). Our study is part of a distinct stream of research, examining the effect of mental imagery on consumer behavioral intention, a domain which to our knowledge is still little studied in the context of tourism. Thus, research on virtual reality has mainly examined mental imagery as an information processing mechanism, while our study has highlighted its importance in predicting (re)visit intention for a specific destination in the domestic tourism context. Secondly, this study proposes a conceptual model aimed at understanding the effect of immersive (vs. non-immersive) VR visits on users' mental imagery and intention to (re)visit. This model incorporates previous experience with the destination as a moderator, in order to demonstrate the extent to which the immersive VR visit influences individuals' intention to (re)visit in the context of tourism.

This study also suggests a number of managerial implications. First of all, for tourism companies, immersive virtual reality should be seen as a fully-fledged management tool for promoting tourist destinations that is likely to increase people's mental imagery. Thus, our results revealed the effectiveness of adopting immersive virtual reality, as it allows tourists to be transported into a virtual world, helping them to create positive mental images. It is also crucial for tourism companies to move beyond the traditional model of presenting tourism products (e.g. 2D video) and adopt immersive VR. This technology can create a distinct and innovative virtual visit experience, creating a sense of belonging to the virtual world and generating positive responses.

Furthermore, according to the results of this study, the use of immersive destination presentations in VR is of particular importance for tourism companies, particularly to inform and persuade individuals who have not yet had direct experience with the proposed destination. For these people with no prior experience, immersive VR visit can create a vivid and engaging first impression of the destination. This first exposure can not only capture their interest, but also favorably influence their decision to visit the real destination in the future. On the other hand, for people with prior experience of the destination, immersive VR marketing must enrich their experience by offering content that goes beyond their existing knowledge, established memories and mental representations in order to have a positive impact. For example, instead of presenting the usual, well-known sites, immersive VR content could show the destination from new angles, at unusual times or in unusual contexts. In this way, immersive VR marketing of archaeological destinations needs to be tailored to the different profiles, preferences and experiences of customers. Furthermore, as the results indicate that people with prior experience of the destination are less likely to want to revisit it when exposed to immersive 360° video (vs. non-immersive), it is crucial that marketers avoid offering standard VR experiences to this group of visitors. This approach can improve the positive impact of immersive VR while avoiding the risk of under-estimating its potential negative effects.

5.2 Limitations and further research

This study has certain limitations that open up perspectives for future research. The first limitation lies in the number of variables taken into account. Future research could incorporate other relevant variables to enrich the proposed conceptual model, such as the emotional responses generated during the immersive VR visit

experience (Ouerghemmi et al., 2023). Secondly, this study is based on the choice of a single destination (Makthar Museum) as a stimulus. However, instead of using a single destination, it would be ideal to use several destinations in different contexts. Future research should therefore replicate this study by incorporating a wide range of destinations in different contexts, such as natural and adventure sites and ecologically sensitive tourism destinations. This approach will provide a better understanding of how different types of destination influence visitor perceptions and behavior in different contexts. Furthermore, although the selection of students seems appropriate for the experiment, it limits the generalisability of the findings to the general population. To overcome this limitation, it would be beneficial to examine the proposed model with a larger and more diverse sample to corroborate our findings. In addition, it would be relevant to examine in future studies the effect of immersive VR visit in countries other than Tunisia. Cross-cultural studies can provide valuable information about the cultural dimension of virtual reality adoption behavior in other geographical areas (Hacikara et al., 2022; Samaddar & Mondal, 2024; Shadiev et al., 2024). It would therefore be beneficial to conduct additional cross-cultural research to broaden the scope of the present study. Similarly, to extend this study, other lines of research deserve to be investigated. Firstly, it would be relevant to examine the effect of cybersickness on the effectiveness of the immersive VR experience. Indeed, several authors have highlighted the significant impact of cybersickness on the effectiveness of immersive VR (Nouri et al., 2025). Secondly, repeated exposure to immersive VR is another promising area (Frechette et al., 2023): future research could determine whether repeated visits influence mental imagery and intention to (re)visit.

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