Examining the effects of virtual reality travel on tourist happiness and travel intentions using extended stimulus-organism-response theory: the perspective of Chinese tourists

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Abstract

The purpose of our study was to identify the psychological mechanisms through which VR presence and enjoyment influence travel intentions and explore how elements of different contexts (hedonic and utilitarian values) to influence travel experience satisfaction. We used Credamo to collect our data and used SPSS 28.0, AMOS 28.0, SPSS Process Macro to analyze the data. The results of analysis showed that VR presence and VR enjoyment positively influence travel experience satisfaction, which, in turn, boosts tourist happiness and positively influenced travel intention. Moderating effect indicate that utilitarian values strengthen the relationship between VR presence and travel experience satisfaction and hedonic values strengthen the relationship between VR enjoyment and travel experience satisfaction. In addition, this study potentially reveals the subtle interrelationships between various factors influencing tourists' behaviors. And it offers key insights into tourist psychology in VR-driven destination marketing.

1. Introduction

Recent advances in virtual reality (VR) have made it a widely used and influential marketing tool in the travel industry (Skard et al., 2021). Using VR, tourist destinations, hotels, and travel agencies can offer immersive experiences at low cost from the comfort of their own homes, and the unique vividness and in teractivity of VR can provide new ways to engage and persuade consumers (Nah et al., 2011). The technology can evoke emotional and physical responses in people (e.g., Macedonio et al., 2007; Riva et al., 2007) by shielding consumers from sensory impressions of the physical world and allowing them to be fully immersed in a virtual world (Fox et al., 2009). In the field of tourism, VR will help improve people's perception of travel destinations. For example, theme parks (Wei et al., 2019), museums (Jung et al., 2016), cultural heritage centers, art galleries,

and more (tom Dieck & Jung, 2017). Immersion in future travel destinations can enable customers to realistically imagine future travel activities and make viable travel plans accordingly (Guttentag, 2010; Wei, 2019) or find lower-cost options for their upcoming travel needs (Lee et al., 2020). As a result, there is growing interest in utilizing VR as a pre-experiential tourism marketing tool (Skard et al., 2021).

Despite the industry's rapid adoption of VR for customer engagement and marketing activities (Flavián et al., 2021), research on the role of VR in the tourism industry and users' psychological acceptance of VR remains scarce (Lee et al., 2020). For example, Zeng et al. (2020) suggested that there has been quite limited exploration of the role of mental imagery as a processing mechanism explaining VR-related outcomes. And other Studies on VR effects on emotions have been limited mainly to evaluations of the VR experience during the time of exposure (i.e., what the consumers feel during the VR) (Kim et al., 2020), and not on affective forecasts of VR-featured objects (i.e., how they think they will fell in the future when visiting the destination) (Skard et al., 2021). Perhaps the most interesting potential of VR in tourism is its ability to produce vivid mental images that consumers can use as a basis for happiness forecasts, if they were to visit the destination. In addition, few studies have explored how different elements of VR in different scenarios may differentially affect the satisfaction of the travel experience. For example, utilitarian and hedonic values are associated with situational and personal factors (Hirschman & Holbrook, 1982; Medlik & Middleton, 1973). To fill this research gap, this study aims to further examine how key elements of VR experiences (VR presence and VR enjoyment) affect tourists' happiness and travel intention through perceived travel experience satisfaction. In addition, Consumers feel and perceive experiences differently depending on the context they are experiencing (Akdim et al., 2022). So, our study introduces utilitarian and hedonic frameworks (Liu et al., 2020; Akdim et al., 2022) as moderating variables to explore how consumers' interest in both types of values moderate the above relationships. Therefore, we raise the following two research questions.

RQ1: How do VR presence and enjoyment influence travel intentions via travel experience satisfaction?

RQ2: How do utilitarian and hedonic values moderate the relationship between VR elements and travel experience satisfaction?

2. Literature Review

2.1. Theoretical background

2.1.1. VR and tourism marketing

Virtual reality (VR) has been of interest to scholars for decades (e.g., Cheong, 1995; Li, et al., 2017, Skard et al., 2021). Cheong (1995) described a virtual tour using VR equipment. He showed that VR is a revolutionary method of obtaining information. In terms of information about a product, VR allows users to experience the product in depth and provide customers with more information (Lee & Chung, 2008). In terms of tourism, VR can produce a compelling sense of presentation (Suh & Chang, 2006). With the use of VR in the tourism industry, this has attracted a great deal of attention from academics and practitioners (Martins et al., 2017). And Skard et al. (2021) suggested that recent advances in VR have made it a widespread and apparently impactful marketing tool for the tourism industry.

Several studies have shown that VR has a huge advantage over traditional marketing tools in terms of stimulating tourists' willingness to travel (e.g. Huang et al., 2013; Spielmann & Mantonakis, 2018). Specifically, Huang et al. (2013) suggest that tourists' positive emotions, emotional engagement, and mind-flow had a positive effect on travel intentions. Spielmann and

Mantonakis (2018) found through an experimental design that virtual tours can influence tourists' attitudes toward the advertised objects.

Although some scholars have found VR to be an effective tool for destination promotion, few studies have explored how different elements of VR in different scenarios may differentially affect the satisfaction of the travel experience. For example, utilitarian and hedonic values are associated with situational and personal factors (Hirschman & Holbrook, 1982; Medlik & Middleton, 1973) and are two variables for understanding people's responses to a given situation. Therefore, in order to explore whether VR elements in different contexts stimulate tourists' satisfaction with their travel experience, which in turn triggers travel intentions. Therefore, we set the moderating variables as utilitarian value and hedonic value to explore the effects of VR on travel experience satisfaction in different contexts.

2.1.2. Stimuli-Organism-Response (S-O-R)

Mehrabian and Russell (1974) argued that sensory aspects of the environment can elicit emotional responses in humans, which can prompt them to approach or avoid the environment. The SOR model describes a set of associations between external environmental factors on a person's internal state and reactive behaviors. The SOR model has been widely developed and used in past research, and consumer intentions and behaviors of the preconditions and influencing processes have often been the focus of research (Baber & Baber, 2022), especially in the field of virtual tourism (Kim et al., 2020; Wei et al., 2023).

In the SOR model, the "S" stands for stimulus, a predictor of consumer perception and a starting point for decision-making, and is often explored in the context of mind-flow experiences (Chen et al., 2020), aesthetic design (Wu & Hsu, 2018), structure, and interpersonal and intra-personal constraints (Schiopu et al., 2022). "O" stands for organism, the internal process between the individual's intervention in external stimuli and the individual's behavior and response. In the original framework, organism mainly refers to emotion and cognition. flow (An et al., 2021), destination attractiveness (Yin et al., 2020), enjoyment (Wu & Lai, 2022), etc. are often used as organisms in the field of tourism to study tourists' behavior. Response is referred to as "R", which is the final behavioral or intentional response obtained after stimuli and organic influences. Following the above logic, this study adopts the SOR model framework as the foundation, VR presence and VR enjoyment as the stimuli, travel experience satisfaction and tourist happiness as the organism, travel intention as the final response.

2.1.3. Value type (utilitarian value and hedonic value)

The experience of use is multidimensional and to study user behavior we should focus on both utilitarian and hedonic motivations (Holbrook & HIrschman, 1982). Some authors argue that consumer motivations can be categorized as utilitarian and hedonic (Childers et al., 2001). To specify, utilitarian values can be defined as an overall judgment of functional benefits and sacrifices (Overby & Lee, 2006). Thus, from a utilitarian perspective, consumer behavior is very task-oriented and rational (Batra & Ahtola, 1991). In contrast, hedonic values are more subjective and personal than utilitarian values (Yang & Lee, 2010). Thus, from a hedonic perspective, consumers want to derive pleasure from using a product or service, such as fun and playfulness (Hirschman & Holbrook, 1982).

Prior literature suggests that when consumers perceive that they derive high levels of utilitarian and hedonic value from an experience, they tend to develop positive behavioral intentions (Chang et al., 2023), such as repurchase intention (Kim et al., 2012) and continued intention (Hamari & Koivisto, 2015).

2.2. Literature review and hypothesis development

2.2.1. VR elements and travel experience satisfaction (H1, H2)

Presence is a key concept in explaining the effectiveness of virtual reality in different contexts of use. Presence has been defined in the literature as the psychological state of being lost or immersed in a mediated environment, i.e., the degree to which a user feels physically "present" in a virtual environment (Steuer, 1995; Slater & Steed, 2000; Schubert et al., 2001). The experience of presence is a complex, multidimensional perception that is shaped by the interaction of multisensory information and various cognitive processes (Diemer et al., 2015).

Presence is a key feature of effective virtual reality applications, as it may be a causal factor influencing human information processing ability and other cognitive variables (Kim & Biocca, 1997; Lombard & Ditton, 1997). Previous results on virtual reality presence suggest that an enhanced sense of reality during a virtual reality experience increases the enjoyment and value of the virtual reality experience itself, positively affects attitudes, beliefs, and intentions, and improves performance (Bystrom et al., 1999; Vora et al., 2002; Suh & Lee, 2005). For example, Kim and Kim (2020) demonstrated that sense of presence had a positive effect on satisfaction from watching a reality travel show. Wei and Zhang (2019) demonstrated that visitors' sense of presence to VR while experiencing a VR roller coaster had a positive effect on overall theme park satisfaction.

H1: VR presence positively influences travel experience satisfaction.

Extrinsic and intrinsic factors are widely considered when exploring users' motivations for using a particular technology or service (Davis et al., 1992). Extrinsic factors focus on the realization and completion of a specific goal, while intrinsic factors indicate the pleasure or satisfaction felt when completing a specific task (Vallerand, 1997). In general, perceived pleasure is defined as "the degree of pleasure perceived in the activity of using a particular system itself, independent of any performance consequences resulting from the use of the system" (Venkatesh, 2000; Davis et al., 1992).

In VR experiences, higher levels of presence are associated with the enjoyment of participating in the virtual environment and the pleasure of interacting with it (Li et al., 2001). That is, virtual environments that produce high levels of presence are perceived as more enjoyable (Sylaiou et al., 2010). Previous research has shown that exposure to images of travel destinations through VR affects interest in and attitudes toward the destination (Thomas & Carey, 2005).

H2: VR enjoyment positively influences travel experience satisfaction.

2.2.2. Travel experience satisfaction and tourist happiness (H3)

Happiness is often interpreted as quality of life or level of happiness (Fu et al., 2020). Tourist happiness combines elements of hedonism and happiness and is a combined state that includes positive emotions, immersive experiences, and meaning acquisition (Filep & Deery, 2010). Past research has shown that travel is a hedonic experience-seeking process and that tourists' happiness varies according to their personality, type of destination, and type of travel activity (Filep, 2014; Bimonte & Faralla, 2014; Chen & Li, 2018). We can know that positive experiences during a trip can improve people's overall happiness. For example, Lee et al. (2018) identified the result that tourists' happiness can be increased through travel experience satisfaction.

Therefore, when tourists have positive emotions and attitudes towards the destination through traveling with VR, they are satisfied during the VR experience, which results in travel satisfaction and consequently, tourist happiness.

H3: Travel experience satisfaction positively influences tourist happiness.

2.2.3. Tourist happiness and travel intention (H4)

Behavioral intentions are considered to be the extent to which tourists find the country, place, or hotel recommendable and intend to visit again in the future (Chen & Gursoy, 2001; Loureiro, 2014). Emotions and their influence on behavioral intentions have been identified as key determinants of consumers' future behavior (Lee et al., 2008). For example, Mulcahy and Pourfakhimi (2024) suggest that happiness mediates the effect of destination appeal on behavioral intentions in heritage tourism.

H4: Tourist happiness positively influences travel intentions.

2.3.4. Moderating effects of value types (H5, H6)

Consumers feel and perceive experiences differently depending on the context they are experiencing (Akdim et al., 2022). For example, hedonic motivation is related to intrinsic motivation, leading humans to perceive experiences as enjoyment-oriented and fun (Picot-Coupey et al., 2021). That is, hedonic values focus on fun, playfulness, and emotional value (Babin et al., 1994). Whereas, utilitarian motivation is related to extrinsic motivations to perform a behavior, such as gaining benefits in terms of ease of information retrieval and finding (Picot-Coupey et al., 2021). That is, utilitarian values focus on the efficiency of obtaining desired information on a Web site (Childers et al., 2001).

Prior research on travel has demonstrated that social presence on travel websites positively affects older adults' satisfaction with traveling online, due to customers' tendency to pursue utilitarian values (Bi & Kim, 2020). Robert and Dennis (2005) also suggest out that when customers use social media with a high sense of social presence, they pay more attention and feel more usefulness than customers with a low sense of social presence. Thus, when customers feel a higher sense of social presence (humanized warmth) in the travel websites they visit for searching or purchasing travel products/services, the impact of the convenience of each service (access, search, rating, transaction, ownership, and post-purchase convenience) on consumer satisfaction is enhanced. In Augmented reality (AR) experiences, Wanna Kicks are focused on providing consumers with augmented information and experiences so that they can make informed, effective purchasing decisions (Rauschnabel et al., 2019). In online shopping, the ability of VR to provide a 360-degree view of a product can increase the value of utilitarian shopping through enhanced information processing (Alzayat & Lee, 2021). In addition, in terms of travel, VR technology is removing the barriers for potential travelers to obtain destination information and understand the barriers before making a visit (Accenture, 2018). Therefore, we hypothesize that the impact of perceived VR presence in VR tourism on satisfaction with the travel experience is susceptible to the moderating effect of utilitarian values.

H5: The effect of VR presence on travel experience satisfaction is positively moderated by utilitarian values.

With the increasing adoption of VR in different industries (Li & Mao, 2015; Choi & Kim,

2017). More and more consumers are engaging in VR tourism activities for hedonic motives (e.g., enjoyment, pleasure). For example, Pantano and Corvello (2014) demonstrated that VR tourism influences tourists' decision-making when users derive pleasure from the VR experience. Tussyadiah et al. (2018) found that enjoyment plays an important role in VR tourism, and that enjoyment leads to the intention to visit attractions. Therefore, we hypothesize that the impact of perceived VR enjoyment in VR tourism on satisfaction with the travel experience is susceptible to the moderating effect of hedonic value.

H6: The effect of VR enjoyment on travel experience satisfaction is positively moderated by hedonic values.
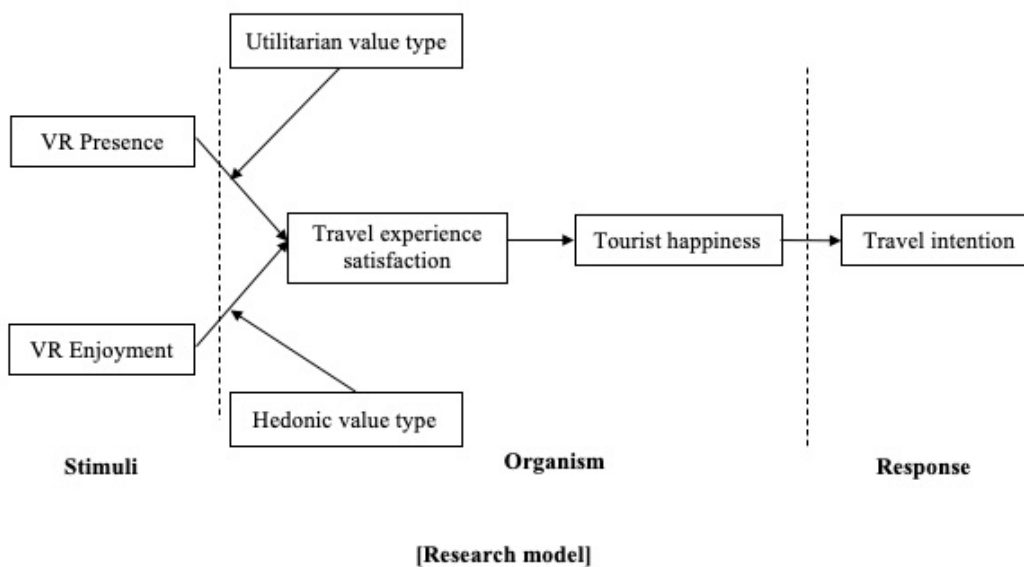
Fig. 1 shows our research model.

[Research model]

Fig. 1

3. Methodology and Procedures

3.1. Measurements

All measures were borrowed and modified from previous studies to fit the context of this study. The questionnaire for this study consisted of 31 items asked in 7 constructs. The measure of VR presence (4 items) was adopted from the study of Wirth et al. (2007) and Tussyadiah et al. (2018) (e.g., VR made me feel capable of engaging with it.). The measure of VR enjoyment (5 items) was adopted from Moon and Kim (2001), Van der Heijden (2003), and Tussyadiah et al. (2018) (e.g., I think using VR would be enjoyable). The travel experience satisfaction (6 items) was adopted from study of Neal et al. (1999), Kim et al. (2015), Su et al. (2015), and Lee et al. (2018) (e.g., During the VR travel experience, I felt that VR travel enriched my life in some ways). The measures of tourist happiness (4 items) were modified form the measures of Kim et al. (2015) and Kim et al. (2015) (e.g., I can consider myself very happy during the VR travel tour). Four items of travel intention were adapted from two studys by Selnes and Sallis (2003) and Maghrifani et al. (2022) (e.g., I intend to visit in the future). Finally, the hedonic value (4 items) was adopted from two studies by Sweeney and Soutar (2001) and Kim and Han (2011) (e.g., VR tourism would be something I

would like). the utilitarian value (4 items) was adopted two studies by Sirdeshmukh et al. (2002) and Kim and Han's (2011) (e.g., using VR tourism would be value for money compared to what I would have to pay). The five-point Likert scale was used to evaluate the level of agreement from 1-strongly disagree to 5-strongly agree. In addition, five questions related to socio-demographics (i.e., gender, age, education, monthly income, and marital status) were included.

3.2. Data collection

Prior to the commencement of the study, all participants were informed of the purpose of the study, assured that their personal information would be encrypted to maintain anonymity, and gave their consent by signing an informed consent form to ensure that their personal information would be protected and kept confidential. The data was collected between October and November 2024, and the data was a survey conducted by the Credamo online questionnaire. A specialized data-collection platform in China that offers data services to researchers across more than 3000 universities worldwide, similar to Qualtrics and Amazon Mechanical Turk (MTurk). Over 1.5 million respondents from a variety of age groups, locations, and professions are included in its sample database (https://www.credamo.com). Credamo was selected for its distinct advantages and functions over other data-collection platforms, including high data quality assurance, accurate target sample positioning, visual statistical modeling, and one-stop services (Tang et al., 2023). On the Credamo platform, stratified sampling was used to select samples targeting Chinese tourists. The reason for adopting the stratified sampling method is that online survey samples may not fully represent the overall population of Chinese tourists. This approach ensures sample representativeness by more accurately reflecting the characteristics of the population. Stratification variables include gender, age, education level, monthly income, and marital status, with a total of five variables.

First, multiple strata were generated based on the combinations of the categories of these variables. Then, the latest demographic data and employment statistics provided by the National Bureau of Statistics of China were referenced to estimate the proportion of each stratum within the overall population of Chinese tourists. Based on these proportions, the sample size was allocated to each stratum. Finally, random sampling was conducted within each stratum according to the allocated sample size. Through this stratified sampling method, the study aimed to obtain a representative sample that reflects the diverse characteristics of the population. Specifically, by considering multiple stratification variables simultaneously, the sample can more accurately reflect the characteristics of the population. Additionally, ensuring sufficient sample sizes for each stratum allows for an effective analysis of the differences in relationships between variables across strata.

The survey collected a total of 350 research samples, and after excluding extreme values such as short response time and non-response, 321 valid questionnaires were left for the final empirical analysis.

3.3. Data analysis

In this study, descriptive analysis presented the demographic. Cronbach's αwas utilized to assess the reliability of each variable using SPSS 28.0. Next, confirmatory factor analysis (CFA) was used to examine the convergent and discriminant validity of the seven main variables. The values of x^2/df, the comparative fit index (CFI), the Tucker lewis index (TLI), the root mean square error of approximation (RMSEA) were examined to assess the overall model fit. The relationship between every variable was presented using correlation analysis If the goal of a study is to test and validate theoretical frameworks, covariance-based structural equation modeling (CB-SEM) is the appropriate method. Conversely, if the focus is on prediction and theoretical development, partial least squares structural equation modeling (PLS-SEM) is more suitable (Dash

& Paul, 2021). In our study, we aimed to test and validate theoretical constructs; therefore, we employed AMOS 28.0 to conduct the analysis using CB-SEM to evaluate the proposed hypotheses. Finally, SPSS Process Macro was used to test the moderating effects.

4. Results and Discussion

4.1. Sample profile

The reason we chose to target Chinese tourists is that they like to travel both domestically and abroad, which is related to tourist attractions and travel experiences, and Chinese tourists plan to use online services (extent of travel apps and services) a lot to get information about destinations, explore attractions, and shop before their trips (Neilsen, 2019).

Of the 321 respondents, 52.6% were male and 47.4% were female. In terms of age distribution, the interviewees ranged from 20 years old to over 60 years old, with the highest proportion (38.6%) in the young segment of 20 to 29 years old, reflecting the fact that the use of VR is mainly dominated by the younger group. In terms of marital status, married people accounted for the highest proportion (78.5%). In terms of education, university graduates (49.5%) dominate. In terms of income, most respondents have a monthly income of roughly between RMB 5,000 and 8,000 (55.5%).

Table 1: Sample profile

Dimensions	Characteristic	Frequency	Percentage
Gender	Male	169	52.6
	Female	152	47.4
Age	20-29	124	38.6
	30-39	94	29.3
	40-49	56	17.4
	50-59	25	7.8
	more than 60	22	6.9
Education	Below high school	62	19.3
	High school diploma	53	16.5
	College/University degree	159	49.5
	Master degree	37	11.5
	Doctorate/Ph.D. degree	10	3.1
Monthly income	less than 3000	30	9.3
	3000-5000	34	10.6
	5000-8000	178	55.5
	more than 8000	79	24.6
Marital	Married	252	78.5
	Single	69	21.5

4.2. Measurement model

This study conducted a confirmatory factor analysis (CFA) using AMOS 28.0. CFA was conducted on the measurement model. The results of CFA showed goodness of fit. x^2 (414) =847.943; x^2/df=2.048<3; GFI=0.900>0.9; TLI= 0.918>0.9; CFI=0.927>0.9; IFI=0.928>0.9; RMSEA=0.057<0.08 (Hoyle, 1995). The factor loadings for each item were good (>0.5). In terms

of validity measures, first, the AVE values were all good, scoring above 0.5, and the CR scores were also good, scoring above 0.7 (Fornell & Larker, 1981). Therefore, the dataset is suitable for measurement modeling.

Table 2: Results of reliability and validity

Construct	Items	Estimate	Cronbach's α	AVE	CR
VR presence	PR1	0.772	0.79	0.60	0.86
	PR2	0.798			
	PR3	0.741			
	PR4	0.788			
VR enjoyment	ENJ1	0.711	0.84	0.51	0.83
	ENJ2	0.708			
	ENJ3	0.693			
	ENJ4	0.691			
	ENJ5	0.760			
Travel experience satisfaction	TES1	0.680	0.87	0.52	0.87
	TES2	0.723			
	TES3	0.759			
	TES4	0.712			
	TES5	0.763			
	TES6	0.723			
Tourist happiness	TH1	0.687	0.80	0.52	0.81
	TH2	0.704			
	TH3	0.767			
	TH4	0.744			
Travel intention	TI1	0.764	0.78	0.57	0.85
	TI2	0.710			
	TI3	0.772			
	TI4	0.793			
Hedonic value	HV1	0.707	0.82	0.53	0.82
	HV2	0.713			
	HV3	0.742			
	HV4	0.772			
Utilitarian value	UV1	0.717	0.82	0.53	0.82
	UV2	0.736			
	UV3	0.783			
	UV4	0.777			

4.3. Discriminant validity and correlations

Typically, discriminant validity is assessed by comparing the squared correlations between two distinct weights in either construct, which should be less than the AVEs by the measures of a construct (Fornell & Larcker, 1981). The results of the discriminant validity test are shown in Table 3. All the square roots of AVEs exceeded the correlation between the constructs comprising each

pair. Consequently, the constructs of this model have acceptable discriminant validity. In addition, it offered preliminary confirmation of hypotheses.

Table 3: Discriminant validity and correlations

Variable	Mean	SD	PR	ENG	TES	TH	TI	HV	UV
PR	3.484	0.993	0.775						
ENJ	3.491	0.997	.521**	0.714					
TES	3.501	0.991	.479**	.566**	0.721				
TH	3.457	1.001	.503**	.556**	.505**	0.721			
TI	3.483	0.967	.504**	.453**	.483**	.546**	0.755		
HV	3.488	1.001	.448**	.482**	.496**	.560**	.516**	0.728	
UV	3.488	1.037	.480**	.542**	.446**	.477**	.565**	.516**	0.728

Notes: ***p-value < 0.001; **p-value < 0.01; *p-value < 0.05;

PR: presence; ENJ: enjoyment; TES: travel experience satisfaction; TH: tourist happiness; TI: travel intention; HV: hedonic value; UV: utilitarian value

The diagonal value is the square roots of AVEs.

4.4. Structural model

Table 4 shows the results of the structural model test. First, the model fit index is very good, $x^2(226) = 572.687$; $x^2/df = 2.534 < 3$; CFI=0.915>0.9; IFI=0.916>0.9; TLI=0.905>0.9; RMSEA=0.069<0.8 (Hoyle, 1995). Therefore, the dataset is suitable for structural modeling.

For the main effects, all four hypotheses were supported (p value<0.05). Specifically, VR presence positively influenced travel experience satisfaction with standardized coefficients of 0.630, thus H1 was supported. VR enjoyment positively influenced travel experience satisfaction with standardized coefficients of 0.786, thus H2 was supported. Similarly, travel experience satisfaction positively influenced tourist happiness with a standardized coefficient of 0.998, thus H3 was supported. Finally, tourist happiness positively influenced travel intention with a standardized coefficient of 0.683, thus H4 is supported (see Fig. 2).

Table 4: The result of SEM

	Hypotheses			B	S.E.	t-value	Result
H1:	PR	--->	TES	0.488***	0.055	8.818	Supported
H2:	ENJ	--->	TES	0.532***	0.054	9.855	Supported
H3:	TES	--->	TH	1.080***	0.121	8.912	Supported
H4:	TH	--->	TI	0.897***	0.102	8.753	Supported

Notes: ***p-value < 0.001; **p-value < 0.01; *p-value < 0.05; B: unstandardized coefficients, S.E.: standard errors.
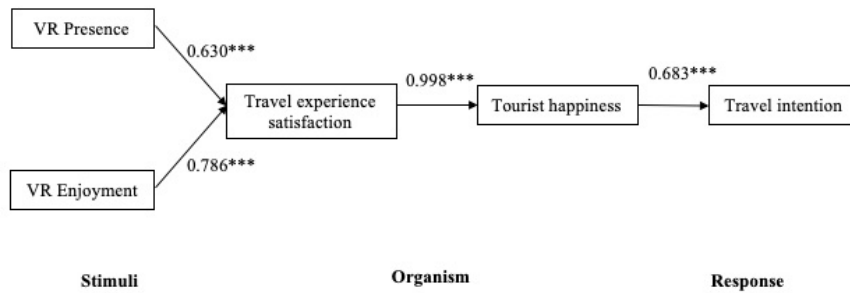
Fig. 2

4.5. The moderating effect testing

We used SPSS Process Macro Model 1 to conduct the moderating effects analysis. To increase understanding of the moderating effects, we used the mean plus or minus one standard deviation as the high and low values, respectively, of the moderating variable and then performed a simple slope analysis. The results of the moderating validity test for utilitarian values are shown table 5. There was little moderating effect between VR presence and travel experience satisfaction in the low utilitarian value group. However, a strong growth relationship was observed in the high utilitarian value group. These results are consistent with the conditional direct effects analysis (see Fig. 3). Compared to the low utilitarian value (-ISD) group (-1SD Effect=0.056, SE=0.047, 95%CI= [-0.082,0.194]), the high utilitarian value (+1SD) group positively contributed to the relationship between VR presence on travel experience satisfaction (+1SD Effect=0.532, SE=0.045, 95% CI= [0.443, 0.621]). Thus, VR presence significantly positive effect on travel experience satisfaction is stronger with high utilitarian values than with low utilitarian values. These findings further support H5.

Table 5: The result of moderating effect test (utilitarian value)

| Items	Effect	se	t	p	95%CI	
					LLCI	ULCI
VR presence	0.294	0.047	6.219	0.000	0.201	0.387
Utilitarian value	0.326	0.045	7.190	0.000	0.237	0.415
VR presence x Utilitarian value	0.230	0.034	6.800	0.000	0.163	0.296
constant	3.693	0.038	97.804	0.000	3.619	3.768
Conditional effects of the focal predictor at values of the moderator(s):	Effect	se	t	p	95%CI	
					LLCI	ULCI
-1SD (-1.037)	0.056	0.070	0.800	0.424	-0.082	0.194
Mean (.000)	0.294	0.047	6.219	0.000	0.201	0.387
+1SD (+1.037)	0.532	0.045	11.791	0.000	0.443	0.621
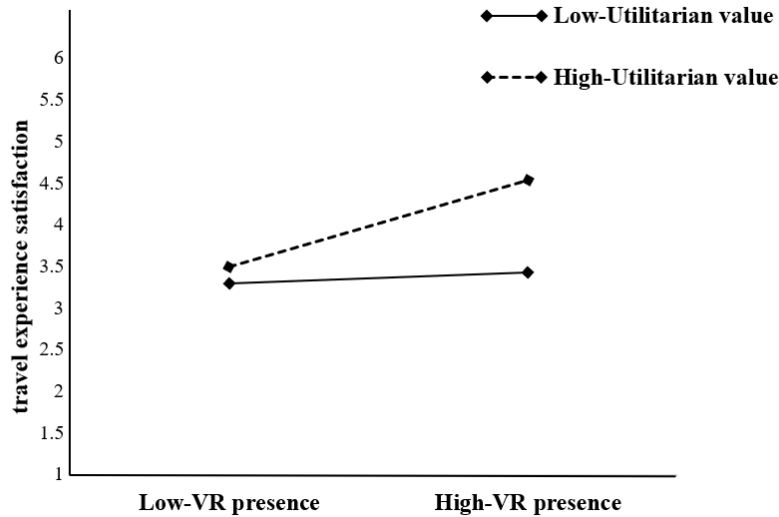
Fig. 3

The results of the moderating validity test for hedonic value are demonstrated see table 6. The relationship between enjoyment and travel experience satisfaction (p<0.05) had a significant moderating effect in the public hedonic value group. As shown in the figure below, there was little moderating effect between VR enjoyment and travel experience satisfaction in the low hedonic value group. However, a strong increasing relationship was observed in the high hedonic value group. These results are consistent with the conditional direct effects analysis (see Fig. 4). Compared to the low hedonic value (-1SD) group (-1SD Effect=0.129, SE=0.066, 95%CI=[-0.001,0.258]), the high hedonic value group (+1SD) positively facilitated the relationship between VR enjoyment on satisfaction with the travel experience (+1SD Effect=0.565, SE=0.042, 95%CI=[0.001,0.258]). 95% CI= [0.482, 0.648]). Thus, VR enjoyment significantly positive effect on travel experience satisfaction is stronger with high hedonic values than with low hedonic values. Therefore, H6 supported.

Table 6: The result of moderating effect test (hedonic value)

| Items	Effect	se	t	p	95%CI	
					LLCI	ULCI
VR enjoyment	0.347	0.045	7.707	0.000	0.258	0.435
Hedonic value	0.323	0.044	7.417	0.000	0.237	0.410
VR enjoyment x Hedonic value	0.216	0.032	6.787	0.000	0.153	0.279
constant	3.684	0.035	105.349	0.000	3.615	3.7652
Conditional effects of the focal predictor at values of the moderator(s):	Effect	se	t	p	95%CI	
					LLCI	ULCI
-1SD (-1.008)	0.129	0.066	1.953	0.517	-0.001	0.258
Mean (.000)	0.347	0.045	7.707	0.000	0.258	0.435
+1SD (1.008)	0.565	0.042	13.401	0.000	0.482	0.648
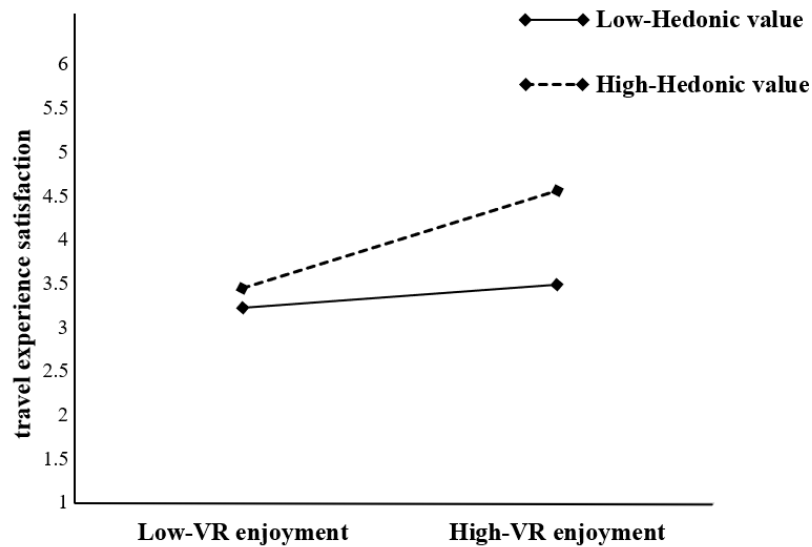
Fig. 4

5. Conclusion and Suggestion

Based on the SOR model, this study analyzed 321 Chinese tourists respondents using SEM to explore the relationship between VR presence, VR enjoyment, travel experience satisfaction, tourist happiness and travel intention. This study utilized the SOR model to delve into Chinese tourists' intention to visit their travel destinations after the Coronavirus. The complex relationship between VR presence, VR enjoyment, travel experience satisfaction, tourist happiness, travel intention was revealed, in which hedonic value and utilitarian value play a key moderating role. The findings not only support the existing literature on the modulatory role of hedonic value and utilitarian value in promoting VR presence and VR enjoyment to travel experience satisfaction, but also provide new insights in the context of VR perspectives. In addition, this study potentially reveals the subtle interrelationships between various factors influencing tourists' behaviors. And it provides valuable insights for assessing the changing tourist psychology in the context of destination promotion from a VR perspective.

Based on these results, the most important contribution of this study is the moderating role of hedonic value and utilitarian value in the relationship between VR presence and VR enjoyment on travel experience satisfaction, which provides valuable empirical evidence for subsequent explorations of VR tourism in the context of VR tourism.

First, our study builds upon and advances the SOR model by incorporating VR-specific variables such as VR presence and VR enjoyment(stimuli). By doing so, we effectively unpack the intricate relationships among these variables, enabling a deeper understanding of how VR presence and enjoyment(stimuli) influence travel experience satisfaction(organism) and how satisfaction impacts tourist happiness(organism) and travel intention(response). Moreover, our findings validate the regulatory roles of hedonic and utilitarian values, enriching the theoretical insights into their significance within VR-driven consumer behavior. Importantly, according to Baber and Baber (2022), our study further solidifies the SOR model's position as a pivotal framework in consumer behavior research, particularly in the domain of virtual tourism (Kim et al., 2020; Wei et al., 2023). This integrative approach not only enhances the explanatory power of the SOR model but also demonstrates its applicability in exploring VR's unique contributions to the tourism industry.

Second, this study makes significant academic contributions by elucidating the psychological

mechanisms underlying VR-driven tourism experiences. Using SEM, we confirmed that VR presence and VR enjoyment exert significant positive effects on travel experience satisfaction. These findings are consistent with prior research by Kim and Kim (2020) and Wei and Zhang (2019), while also addressing a gap in existing VR literature. By providing robust empirical evidence for the role of VR presence in shaping travel experience satisfaction, this study deepens our understanding of the psychological processes that underlie immersive tourism experiences. The results underscore the importance of VR-induced presence and enjoyment in enhancing satisfaction with travel experiences, which holds considerable theoretical significance for advancing VR research. Additionally, our findings reveal that when VR tourism fosters a strong sense of travel experience satisfaction and tourist happiness, individuals are more likely to develop an intention to visit the associated destinations in the future. This outcome extends the work of Lee et al. (2018) and Mulcahy and Pourfakhimi (2024), highlighting the transformative potential of virtual tourism in bridging digital experiences and real-world travel behaviors. By demonstrating how VR can effectively stimulate travel intentions, this study reinforces the critical role of VR as a marketing tool for destination promotion. These insights offer valuable academic implications for understanding the strategic integration of VR technology in tourism marketing, further enriching the theoretical framework of consumer behavior in virtual environments.

Third, this study reveals the impact of high utilitarian values on travel experience satisfaction by enhancing VR presence through enhanced information processing efficiency. This suggests that for market segments that focus on utility and functionality (e.g., business travelers or rational decision makers), it is particularly important to enhance the utility function of VR and the clarity of information presentation. In contrast, high hedonic values emphasize pleasure and entertainment in the VR experience, further enhancing the positive impact of VR on satisfaction. This has important implications for market segments seeking entertainment and emotional connection, such as leisure travelers or millennials. Therefore, optimizing VR design for different market segments can more effectively meet consumer needs and enhance market competitiveness.

VR can be applied in all areas of tourism, from live entertainment and education to pre-experiential marketing communications and destination presentation of tourist attractions. This study examines VR from the perspective of the latter (tourist attraction destinations), i.e., how the characteristics of VR (presence and pleasure) influence potential consumers to visit a destination.

First, this study identifies the key factors that influence respondents' use of VR and increase their willingness to visit the destination in the future. The findings suggest that presence and pleasure can enhance users' travel experience satisfaction, which in turn promotes tourist happiness, thus increasing their willingness to actually visit the destination. Therefore, in order to better encourage potential tourists, VR operators should further enhance the detailed presentation of tourist attractions so that users feel a stronger sense of presence and enjoyment in the virtual experience Ultimately, respondents' positive attitudes toward VR will significantly drive their intentions to actually visit the destination.

Second, this study provides an important practical contribution to the field of VR applications in the context of tourism consumption. The findings provide new insights for destination organizers and hotel marketers on how to use VR technology to promote and market tourism resources (e.g., attractions, restaurants, hotels, etc.) more efficiently. Through VR technology, users are able to have an immersive and realistic experience, as if they were there, so that they can more intuitively perceive the unique charms of different destinations and choose the destination that best meets their needs among multiple options. This finding provides strong support for innovative marketing strategies in the tourism industry.

Third, the results of this study provide strong empirical support for destination marketers,

travel agencies, and other tourism suppliers that VR is an efficient marketing tool. With the increasing popularity of VR devices, more and more consumers are relying on VR technology to participate in tourism-related decisions and experiences, which further highlights its potential in the marketing field. Thus, investing in the development and application of VR technology is undoubtedly a strategically valuable option that can help tourism suppliers seize the lead in a competitive market.

Fourth, as VR technology becomes increasingly integrated into tourism marketing, it is essential for destination marketers to strategically design VR applications that maximize both utilitarian and hedonic values to influence tourist decision-making and enhance satisfaction. To optimize utilitarian value, VR applications should focus on providing detailed, informative, and practical content about destinations. For example, interactive features that allow users to explore key attractions, accommodations, and amenities in a structured and comprehensive way can significantly enhance the perceived utility of the VR experience. Features such as guided tours, real-time booking integration, and detailed itineraries can further address functional needs, making the VR application not only engaging but also a practical tool for trip planning. To maximize hedonic value, VR experiences should emphasize immersive and emotionally engaging elements that evoke enjoyment and excitement. High-quality graphics, realistic soundscapes, and gamified features, such as challenges or rewards, can create a memorable and enjoyable experience. Additionally, storytelling elements that highlight the unique culture, history, and natural beauty of the destination can heighten the emotional appeal, fostering a deeper connection between users and the destination. Strategically, destination marketers can leverage these dual values by creating VR campaigns tailored to different stages of the customer journey. For example, during the inspiration phase, immersive and entertaining VR experiences can spark interest and generate emotional engagement. During the planning phase, utilitarian features can help users make informed decisions, thereby increasing their confidence and satisfaction. Ultimately, integrating these strategies ensures that the VR experience not only captures users' attention but also translates into a strong willingness to visit the destination, enhancing both destination competitiveness and customer satisfaction.

Despite its contributions, this study has some limitations that should be addressed in future research. First, despite the adequate sample size and high data quality of this study, the respondents were all from the same country, which may limit the broad applicability of the findings. Therefore, future studies may consider selecting a more geographically diverse sample to more fully reveal the potential impact of different cultural contexts on the study variables. This cross-cultural perspective will help enhance the generalizability and theoretical value of the study. Second, this study explored the relationship between VR tourism and experiencer responses through a questionnaire survey. In analyzing the effects of VR on experiencer responses, future research could further adopt an experimental design to reveal the causal effects of VR components on VR use more precisely. This is because experimental results may vary depending on the virtual environment (e.g., desktop computers, smartphones, or VR head-mounted displays) used by respondents, which provides an important direction for future research to more fully understand the role of different devices in the VR experience. Finally, people's sociality should also be taken into account and should be included in future VR research. We suggest that human interactions with travel companions in virtual reality will be further explored in future research to understand how they affect behavioral intentions, engagement, or satisfaction. Finally, since the research population in this study was primarily consumers, this could have triggered a potential common methodology bias (CMB). To minimize this bias, future studies could adopt a multi-source data collection strategy. For example, data on relevant indicators could be collected from consumers and salespeople separately, thus avoiding

systematic bias due to a single source of information.

References

1. Accenture. (2018). Exploring unchartered territory: Innovative technologies transforming travel in real-time.
2. Akdim, K., Casaló, L. V., & Flavián, C. (2022). The role of utilitarian and hedonic aspects in the continuance intention to use social mobile apps. *Journal of Retailing and Consumer Services*, *66*, 102888.
3. Alzayat, A., & Lee, S. H. M. (2021). Virtual products as an extension of my body: Exploring hedonic and utilitarian shopping value in a virtual reality retail environment. *Journal of Business Research*, *130*, 348-363.
4. An, S., Choi, Y., & Lee, C. K. (2021). Virtual travel experience and destination marketing: Effects of sense and information quality on flow and visit intention. *Journal of Destination Marketing & Management*, *19*, 100492.
5. Baber, R., & Baber, P. (2023). Influence of social media marketing efforts, e-reputation and destination image on intention to visit among tourists: application of SOR model. *Journal of Hospitality and Tourism Insights*, *6*(5), 2298-2316.
6. Babin, B. J., Darden, W. R., & Griffin, M. (1994). Work and/or fun: measuring hedonic and utilitarian shopping value. *Journal of consumer research*, *20*(4), 644-656.
7. Batra, R., & Ahtola, O. T. (1991). Measuring the hedonic and utilitarian sources of consumer attitudes. *Marketing letters*, *2*, 159-170.
8. Bi, Y., & Kim, I. (2020). Older travelers' E-loyalty: The roles of service convenience and social presence in travel websites. *Sustainability*, *12*(1), 410.
9. Bimonte, S., & Faralla, V. (2014). Happiness and nature-based vacations. *Annals of Tourism Research*, *46*(5), 176-178.
10. Bystrom, K. E., Barfield, W., & Hendrix, C. (1999). A conceptual model of the sense of presence in virtual environments. *Presence: Teleoperators & Virtual Environments*, *8*(2), 241-244.
11. Chang, Y. W., Hsu, P. Y., Chen, J., Shiau, W. L., & Xu, N. (2023). Utilitarian and/or hedonic shopping–consumer motivation to purchase in smart stores. *Industrial Management & Data Systems*, *123*(3), 821-842.
12. Chen, J. S., & Gursoy, D. (2001). An investigation of tourists' destination loyalty and preferences. *International Journal of Contemporary Hospitality Management*, *13*(2), 79-85.
13. Chen, X., Cheng, Z. F., & Kim, G. B. (2020). Make it memorable: Tourism experience, fun, recommendation and revisit intentions of Chinese outbound tourists. *Sustainability*, *12*(5), 1904.
14. Chen, Y., & Li, X. R. (2018). Does a happy destination bring you happiness? Evidence from Swiss inbound tourism. *Tourism management*, *65*, 256-266.
15. Cheong, R. (1995). The virtual threat to travel and tourism. *Tourism management*, *16*(6), 417-422.
16. Childers, T. L., Carr, C. L., Peck, J., & Carson, S. (2001). Hedonic and utilitarian motivations for online retail shopping behavior. *Journal of retailing*, *77*(4), 511-535.
17. Choi, H. S., & Kim, S. H. (2017). A content service deployment plan for metaverse museum exhibitions—Centering on the combination of beacons and HMDs. *International journal of information management*, *37*(1), 1519-1527.
18. Davis, F. D., Bagozzi, R. P., & Warshaw, P. R. (1992). Extrinsic and intrinsic motivation to

use computers in the workplace 1. *Journal of applied social psychology*, *22*(14), 1111-1132.

19. Diemer, J., Alpers, G. W., Peperkorn, H. M., Shiban, Y., & Mühlberger, A. (2015). The impact of perception and presence on emotional reactions: a review of research in virtual reality. *Frontiers in psychology*, *6*, 26.

20. Dash, G., & Paul, J. (2021). CB-SEM vs PLS-SEM methods for research in social sciences and technology forecasting. *Technological Forecasting and Social Change*, *173*, 121092.

21. Filep, S. (2014). Moving beyond subjective well-being: A tourism critique. *Journal of Hospitality & Tourism Research*, *38*(2), 266-274.

22. Filep, S., & Deery, M. (2010). Towards a picture of tourists' happiness. *Tourism Analysis*, *15*(4), 399-410.

23. Flavián, C., Ibáñez-Sánchez, S., & Orús, C. (2021). Integrating virtual reality devices into the body: effects of technological embodiment on customer engagement and behavioral intentions toward the destination. In *Future of Tourism Marketing* (pp. 79-94). Routledge.

24. Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of marketing research*, *18*(1), 39-50.

25. Fox, J., Arena, D., & Bailenson, J. N. (2009). Virtual reality: A survival guide for the social scientist. *Journal of Media Psychology*, *21*(3), 95-113.

26. Fu, X., Ridderstaat, J., & Jia, H. C. (2020). Are all tourism markets equal? Linkages between market-based tourism demand, quality of life, and economic development in Hong Kong. *Tourism Management*, *77*, 104015.

27. Guttentag, D. A. (2010). Virtual reality: Applications and implications for tourism. *Tourism management*, *31*(5), 637-651.

28. Hamari, J., & Koivisto, J. (2015). Why do people use gamification services?. *International journal of information management*, *35*(4), 419-431.

29. Hirschman, E. C., & Holbrook, M. B. (1982). Hedonic consumption: emerging concepts, methods and propositions. *Journal of marketing*, *46*(3), 92-101.

30. Hoyle, R. H. (Ed.). (1995). *Structural equation modeling: Concepts, issues, and applications*. Sage.

31. Huang, Y. C., Backman, S. J., Backman, K. F., & Moore, D. (2013). Exploring user acceptance of 3D virtual worlds in travel and tourism marketing. *Tourism management*, *36*, 490-501.

32. Jung, T., tom Dieck, M. C., Lee, H., & Chung, N. (2016). Effects of virtual reality and augmented reality on visitor experiences in museum. In *Information and communication technologies in tourism 2016: Proceedings of the international conference in Bilbao, Spain, February 2-5, 2016* (pp. 621-635). Springer International Publishing.

33. Kim, B. K., & Kim, K. O. (2020). Relationship between viewing motivation, presence, viewing satisfaction, and attitude toward tourism destinations based on TV travel reality variety programs. *Sustainability*, *12*(11), 4614.

34. Kim, B., & Han, I. (2011). The role of utilitarian and hedonic values and their antecedents in a mobile data service environment. *Expert Systems with Applications*, 38(3), 2311-2318.

35. Kim, C., Galliers, R. D., Shin, N., Ryoo, J. H., & Kim, J. (2012). Factors influencing Internet shopping value and customer repurchase intention. *Electronic commerce research and applications*, *11*(4), 374-387.

36. Kim, H., Lee, S., Uysal, M., Kim, J., & Ahn, K. (2015). Nature-based tourism: Motivation and subjective well-being. *Journal of Travel & Tourism Marketing*, 32(sup1), S76-S96.

37. Kim, H., Woo, E., & Uysal, M. (2015). Tourism experience and quality of life among elderly tourists. *Tourism management*, 46, 465-476.

38. Kim, M. J., Lee, C. K., & Jung, T. (2020). Exploring consumer behavior in virtual reality tourism using an extended stimulus-organism-response model. *Journal of travel research*, 59(1), 69-89.

39. Kim, T., & Biocca, F. (1997). Telepresence via television: Two dimensions of telepresence may have different connections to memory and persuasion. *Journal of computer-mediated communication*, 3(2), JCMC325.

40. Lee, H., Lee, J., Chung, N., & Koo, C. (2018). Tourists' happiness: are there smart tourism technology effects?. *Asia Pacific Journal of Tourism Research*, 23(5), 486-501.

41. Lee, K. C., & Chung, N. (2008). Empirical analysis of consumer reaction to the virtual reality shopping mall. *Computers in Human Behavior*, 24(1), 88-104.

42. Lee, M., Lee, S. A., Jeong, M., & Oh, H. (2020). Quality of virtual reality and its impacts on behavioral intention. *International Journal of Hospitality Management*, 90, 102595.

43. Lee, Y. K., Lee, C. K., Lee, S. K., & Babin, B. J. (2008). Festivalscapes and patrons' emotions, satisfaction, and loyalty. *Journal of business research*, 61(1), 56-64.

44. Li, H., Daugherty, T., & Biocca, F. (2001). Characteristics of virtual experience in electronic commerce: A protocol analysis. *Journal of interactive Marketing*, 15(3), 13-30.

45. Li, M., & Mao, J. (2015). Hedonic or utilitarian? Exploring the impact of communication style alignment on user's perception of virtual health advisory services. *International Journal of Information Management*, 35(2), 229-243.

46. Li, S. C., Robinson, P., & Oriade, A. (2017). Destination marketing: The use of technology since the millennium. *Journal of destination marketing & management*, 6(2), 95-102.

47. Liu, F., Lim, E. T., Li, H., Tan, C. W., & Cyr, D. (2020). Disentangling utilitarian and hedonic consumption behavior in online shopping: An expectation disconfirmation perspective. *Information & Management*, 57(3), 103199.

48. Loureiro, S. M. C. (2014). The role of the rural tourism experience economy in place attachment and behavioral intentions. *International journal of hospitality management*, 40, 1-9.

49. Macedonio, M. F., Parsons, T. D., Digiuseppe, R. A., Weiderhold, B. A., & Rizzo, A. A. (2007). Immersiveness and physiological arousal within panoramic video-based virtual reality. *Cyberpsychology & Behavior*, 10(4), 508-515.

50. Maghrifani, D., Liu, F., & Sneddon, J. (2022). Understanding potential and repeat visitors' travel intentions: the roles of travel motivations, destination image, and visitor image congruity. Journal of Travel Research, 61(5), 1121-1137.

51. Martins, J., Gonçalves, R., Branco, F., Barbosa, L., Melo, M., & Bessa, M. (2017). A multisensory virtual experience model for thematic tourism: A Port wine tourism application proposal. *Journal of destination marketing & management*, 6(2), 103-109.

52. Medlik, S., & Middleton, V. T. (1973). Product formulation in tourism. *Tourism and marketing*, 13(1), 138-154.

53. Mehrabian, A. and Russell, J.A. (1974), An Approach to Environmental Psychology, The MIT Press, Cambridge, pp. 56-63.

54. Moon, J. W., & Kim, Y. G. (2001). Extending the TAM for a World-Wide-Web context. *Information & management*, 38(4), 217-230.

55. Mulcahy, R., Prayag, G., & Pourfakhimi, S. (2024). Enhancing Quality of Life through Travel, Happiness, and Psychological Resilience: The Influences of Coping and Vulnerability. *Journal of Travel Research*, 00472875241288481.

56. Nah, F. F. H., Eschenbrenner, B., & DeWester, D. (2011). Enhancing brand equity through flow and telepresence: A comparison of 2D and 3D virtual worlds. *MIs Quarterly*, 731-747.

57. Neal, J. D., Sirgy, M. J., & Uysal, M. (1999). The role of satisfaction with leisure travel/tourism services and experience in satisfaction with leisure life and overall life. *Journal of Business Research*, 44(3), 153-163.

58. Neilson. (2017). Outbound Chinese tourism and consumption trends.

59. Overby, J. W., & Lee, E. J. (2006). The effects of utilitarian and hedonic online shopping value on consumer preference and intentions. *Journal of Business research*, *59*(10-11), 1160-1166.

60. Pantano, E., & Corvello, V. (2014). Tourists' acceptance of advanced technology-based innovations for promoting arts and culture. *International Journal of Technology Management*, *64*(1), 3-16.

61. Picot-Coupey, K., Krey, N., Huré, E., & Ackermann, C. L. (2021). Still work and/or fun? Corroboration of the hedonic and utilitarian shopping value scale. *Journal of Business Research*, *126*, 578-590.

62. Rauschnabel, P. A., Felix, R., & Hinsch, C. (2019). Augmented reality marketing: How mobile AR-apps can improve brands through inspiration. *Journal of Retailing and Consumer Services*, 49, 43-53.

63. Riva, G., Mantovani, F., Capideville, C. S., Preziosa, A., Morganti, F., Villani, D., ... & Alcañiz, M. (2007). Affective interactions using virtual reality: the link between presence and emotions. *Cyberpsychology & behavior*, *10*(1), 45-56.

64. Robert, L. P., & Dennis, A. R. (2005). Paradox of richness: A cognitive model of media choice. *IEEE transactions on professional communication*, *48*(1), 10-21.

65. Schiopu, A. F., Hornoiu, R. I., Padurean, A. M., & Nica, A. M. (2022). Constrained and virtually traveling? Exploring the effect of travel constraints on intention to use virtual reality in tourism. *Technology in Society*, *71*, 102091.

66. Schubert, T., Friedmann, F., & Regenbrecht, H. (2001). The experience of presence: Factor analytic insights. *Presence: Teleoperators & Virtual Environments*, *10*(3), 266-281.

67. Selnes, F., & Sallis, J. (2003). Promoting relationship learning. *Journal of marketing*, 67(3), 80-95.

68. Sirdeshmukh, D., Singh, J., & Sabol, B. (2002). Consumer trust, value, and loyalty in relational exchanges. *Journal of marketing*, 66(1), 15-37.

69. Skard, S., Knudsen, E. S., Sjåstad, H., & Thorbjørnsen, H. (2021). How virtual reality influences travel intentions: The role of mental imagery and happiness forecasting. *Tourism Management*, *87*, 104360.

70. Slater, M., & Steed, A. (2000). A virtual presence counter. *Presence*, *9*(5), 413-434.

71. Spielmann, N., & Mantonakis, A. (2018). In virtuo: How user-driven interactivity in virtual tours leads to attitude change. *Journal of Business Research*, *88*, 255-264.

72. Steuer, J. (1995). Defining virtual reality: Dimensions determining telepresence. *Communication in the age of virtual reality/Lawrence Erlbaum and Associates*.

73. Su, L., Huang, S., & Chen, X. (2015). Effects of service fairness and service quality on tourists' behavioral intentions and subjective well-being. *Journal of Travel & Tourism Marketing*, 32(3), 290-307.

74. Suh, K. S., & Chang, S. (2006). User interfaces and consumer perceptions of online stores: The role of telepresence. *Behaviour & information technology*, *25*(2), 99-113.

75. Suh, K. S., & Lee, Y. E. (2005). The effects of virtual reality on consumer learning: An empirical investigation. *Mis Quarterly*, 673-697.

76. Sweeney, J. C., & Soutar, G. N. (2001). Consumer perceived value: The development of a multiple item scale. *Journal of retailing*, 77(2), 203-220.

77. Sylaiou, S., Mania, K., Karoulis, A., & White, M. (2010). Exploring the relationship between presence and enjoyment in a virtual museum. *International journal of human-computer studies*, *68*(5), 243-253.

78. Thomas, W. A., & Carey, S. (2005, April). Actual/virtual visits: What are the links. In *Museums and the Web* (pp. 13-16).

79. tom Dieck, M. C., & Jung, T. H. (2017). Value of augmented reality at cultural heritage sites: A stakeholder approach. *Journal of destination marketing & management*, *6*(2), 110-117.

80. Tussyadiah, I. P., Wang, D., Jung, T. H., & Tom Dieck, M. C. (2018). Virtual reality, presence, and attitude change: Empirical evidence from tourism. *Tourism management*, *66*, 140-154.

81. Tang, Y., Zhang, Y., & Ning, X. (2023). Uncertainty in the platform market: the information asymmetry perspective. *Computers in Human Behavior*, *148*, 107918.

82. Vallerand, R. J. (1997). Toward a hierarchical model of intrinsic and extrinsic motivation. *Advances in experimental social psychology/Academic Press*.

83. Van der Heijden, H. (2003). Factors influencing the usage of websites: the case of a generic portal in The Netherlands. *Information & management*, 40(6), 541-549.

84. Venkatesh, V. (2000). Determinants of perceived ease of use: Integrating perceived behavioral control, computer anxiety and enjoyment into the technology acceptance model. *Information systems research*, *11*(4), 342-365.

85. Vora, J., Nair, S., Gramopadhye, A. K., Duchowski, A. T., Melloy, B. J., & Kanki, B. (2002). Using virtual reality technology for aircraft visual inspection training: presence and comparison studies. *Applied ergonomics*, *33*(6), 559-570.

86. Wei, W. (2019). Research progress on virtual reality (VR) and augmented reality (AR) in tourism and hospitality: A critical review of publications from 2000 to 2018. *Journal of Hospitality and Tourism Technology*, *10*(4), 539-570.

87. Wei, W., Baker, M. A., & Onder, I. (2023). All without leaving home: building a conceptual model of virtual tourism experiences. *International Journal of Contemporary Hospitality Management*, *35*(4), 1284-1303.

88. Wei, W., Qi, R., & Zhang, L. (2019). Effects of virtual reality on theme park visitors' experience and behaviors: A presence perspective. *Tourism management*, *71*, 282-293.

89. Wirth, W., Hartmann, T., Böcking, S., Vorderer, P., Klimmt, C., Schramm, H., ... & Jäncke, P. (2007). A process model of the formation of spatial presence experiences. *Media psychology*, 9(3), 493-525.

90. Wu, S. L., & Hsu, C. P. (2018). Role of authenticity in massively multiplayer online role playing games (MMORPGs): Determinants of virtual item purchase intention. *Journal of Business Research*, *92*, 242-249.

91. Wu, X., & Lai, I. K. W. (2022). The use of 360-degree virtual tours to promote mountain walking tourism: Stimulus–organism–response model. *Information Technology & Tourism*, *24*(1), 85-107.

92. Yang, K., & Lee, H. J. (2010). Gender differences in using mobile data services: utilitarian and hedonic value approaches. *Journal of Research in Interactive Marketing*, *4*(2), 142-156.

93. Yin, J., Cheng, Y., Bi, Y., & Ni, Y. (2020). Tourists perceived crowding and destination attractiveness: The moderating effects of perceived risk and experience quality. *Journal of Destination Marketing & Management*, *18*, 100489.

94. Zeng, G., Cao, X., Lin, Z., & Xiao, S. H. (2020). When online reviews meet virtual reality: Effects on consumer hotel booking. *Annals of Tourism Research*, *81*, 102860.