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VR the World: Investigating the Effectiveness of Virtual Reality for Destination Marketing through Presence, Emotion, and Intention

VR's unprecedented ability to virtually transport the user is purported to be its biggest strength. Yet, despite early postulations about VR's benefits as a destination marketing; substantial, theory-based VR research in tourism remains in infancy. The objective of this study is to empirically investigate the effectiveness of VR as a destination marketing tool, theoretically underpinned by the concept of presence and its influence on emotions and intentions. A within-subjects experiment is utilized to compare the effectiveness of VR, videos and pictures for cruise ship marketing. The results suggest VR could be more effective as a marketing tool and also provide insights into the impact of key presence determinants. Practical implications and avenues for future research are also discussed.

Key words: virtual reality, destination marketing, presence, emotion, experiment

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Introduction

In destination marketing, the goal is to communicate features of an intangible experiential product (Hyun & O'Keefe, 2012). VR's unprecedented ability to virtually transport the user is purported to be its biggest strength (Guttentag, 2010). Yet, despite early postulations about VR's benefits as a destination marketing tool (Cheong, 1995; Guttentag, 2010; Huang, Backman, Backman, & Chang, 2016); substantial, theory-based VR research in tourism remains in infancy. The objective of this study is to empirically investigate the effectiveness of VR as a destination marketing tool, theoretically underpinned by the concept of presence and its influence on emotions and intentions.

Literature Review

In information technology research, studies on VR and immersive media in general have focused on the constructs of presence (Nunez & Blake, 2001). Presence has been the focus of many studies of VR because it is the subjective experience of being in an environment, whilst physically being situated in another (Witmer & Singer, 1998); the theoretical underpinning of evoking vicarious experiences or virtual transportation. Unsurprisingly, researchers have suggested that presence is vital in measuring VR effectiveness (Meehan, Razzaque, Insko, Whitton, & Brooks, 2005; Sheridan, 1992; Zeltzer, 1992). However, despite the prominence of presence in information technology (IT)-based VR research, to date only a handful of presence studies have appeared in the tourism VR literature (for example Hyun & O'Keefe, 2012; Tussyadiah, Wang, Jung, & tom Dieck, 2018). Calls have been made for more interdisciplinary studies across VR studies on presence (Draper, Kaber, & Usher, 1998; Lombard & Ditton, 1997) and emotion (Banos et al., 2008; Riva, Banos, Botella, Mantovani, & Gaggioli, 2016; Riva et al., 2007; Villani, Repetto, Cipresso, & Riva, 2012) for better understanding of the consequences of presence. The absence of research combining presence and emotion in tourism is especially highlighted when juxtaposed against the growing

importance of emotion research in destination marketing (Hazlett & Hazlett, 1999; Li, Walters, Packer, & Scott, 2016). This study aims to fill that gap by first establishing a framework encompassing Presence (P), Emotion (E), and Intention (I), then investigating the PEI framework through empirical studies using mixed-method experiments in a destination marketing context. This study is also the first to incorporate the determinants and consequences of presence; and their effects on emotion, and intention in a top-to-bottom PEI framework (Figure 1).
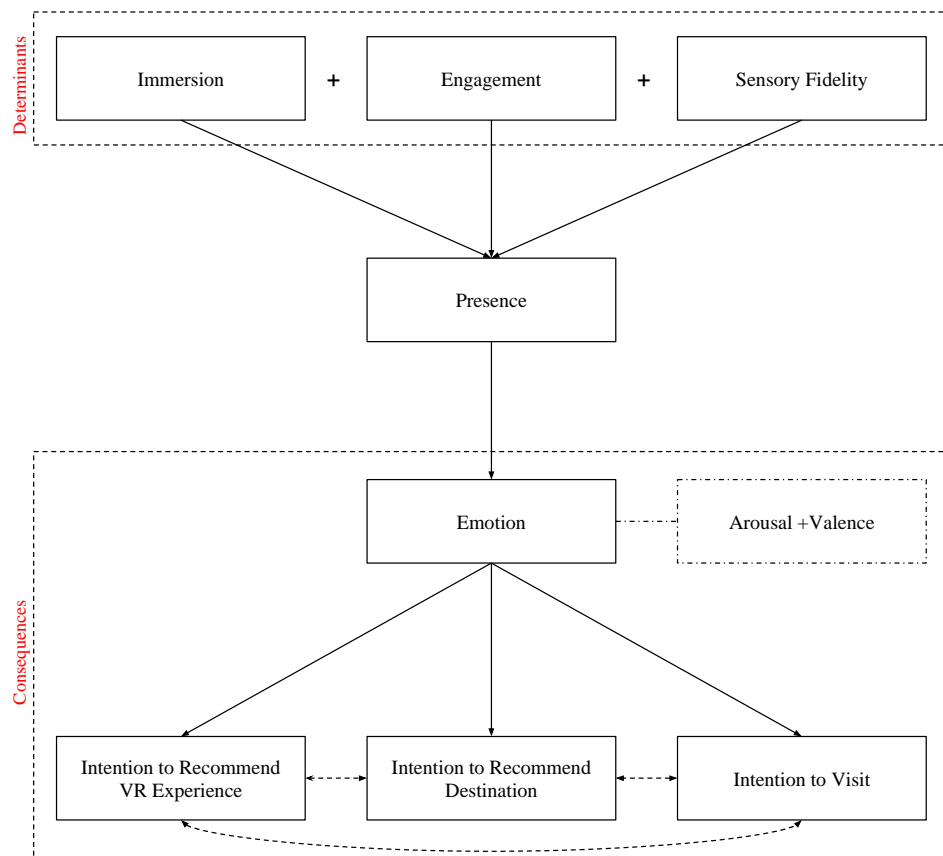

Figure 1. Conceptual Framework Encompassing Presence, Emotion, and Intention.

Methodology

This study utilised a partially mixed sequential dominant status design (QUANT -> qual) according to Leech and Onwuegbuzie (2007)'s typology of mixed methods designs. The dominant phase was quantitative, which the presentation will focus on. A within-subjects

experiment design was utilised. Although scarce, experiments have been used in studying VR and destination marketing. Griffin, Giberson, Lee, Guttentag, and Kandaurova (2017) used a between-subjects experiment to study differences in VR, video, and websites effectiveness on influencing the affective dimension of destination image. In their limitations, they concluded that the varying degrees of participants' previous interaction with VR may have influenced results due to the effects of novelty; recommending a within-subjects design in future research. Bastiaansen et al. (2018), evaluating destination marketing effectiveness using neuromarketing techniques, similarly concluded that a within-subjects design in future research would reduce intervening variables. The within-subjects design is also known as the most internally valid research design in the social sciences (Bastiaansen et al., 2018). Having each participant act as their own control is an effective and valuable method (Mandryk, Inkpen, & Calvert, 2006). Hence, the decision to use a within-subject approach in this study.

Data Collection and Sample

The sample population for this study will be Millennials (Generation Y). Millennials are loosely defined as people born between the years of 1981 and 1999 (Bolton et al., 2013). For the purposes of this study, the criterion for age was between 18 and 35 years old. Justification for millennials as the study's sample is two-fold. Firstly, millennials have been identified as a key market segment in VR adoption and interest (GreenlightVR, 2015). Secondly, Millennials as a sample is suited to the stimuli used in this study. The stimuli that participants were exposed to are marketing material developed for use by Princess Cruises. Therefore, the goal of the stimuli is to influence viewers to go on cruises. The Cruise Lines International Association (CLIA) 2018 Outlook Report identifies Millennials as a growing market segment that continues to gain traction in an industry traditionally appealing to an older

demographic (CLIA, 2017). The same report suggests an increase in usage of smart travel technology by both cruise lines and cruisers (CLIA, 2017). For the purposes of this submission, data analysis below was done on the first 11 participants. The projected sample size will be close to 80 at the time of presentation.

After reading written instructions and giving their informed consent, participants experienced destination marketing material from the Majestic Princess cruise ship in three different mediums, developed by Digital Frontier (who is the industry partner of this study) in July 2017. For traditional media, photographs (Stimuli A) and videos (Stimuli B) from the marketing mix were viewed on a desktop monitor. A 3D fully interactive VR experience, allowing users to walk around the cruise ship, was viewed through the HTC Vive headset (Stimuli C). The length of each exposure was between 2 to 3 minutes. To reduce order effects, the order in which participants experience the pictures, video and VR were randomized (Li et al., 2016; Riva et al., 2007). There were six possible sequences: A-B-C, A-C-B, B-A-C, B-C-A, C-A-B, and C-B-A.

After each condition, participants completed a self-report questionnaire. The questionnaire contained components to measure presence, emotion, and intention. The questionnaire used to measure presence was the ITC Sense of Presence Inventory (ITC-SOPI) created by Lessiter, Freeman, Keogh, and Davidoff (2001). The ITC-SOPI has been extensively used in presence studies in ICT (Riva et al., 2007; Villani et al., 2012), psychology (Banos et al., 2004), advertising (Li, Daugherty, & Biocca, 2002), and video games (Shafer, Carbonara, & Popova, 2014). The ITC-SOPI was deemed the most suitable measure as it is particularly suited to studies measuring presence across different media platforms (Schuemie, van der Straaten, Krijn, & van der Mast, 2001). The protocol measures presence through Spatial Presence, Engagement, Ecological Validity, and Negative effects.

The Self-Assessment Manikin (SAM) was used to measure emotion (arousal-valence) (Bradley & Lang, 1994; Lang, Bradley, & Cuthbert, 1997; Russell, 1980). The SAM is also used by Bastiaansen et al. (2018) to measure emotional response in evaluating popular movies as destination marketing content. The SAM affective rating system is a graphic figure depicting values along the dimensions of valence and arousal. Participants rate their valence and arousal on a scale of 1 to 9 corresponding to how closely they feel to the depicted graphic figure above the ratings.

Intention to visit destination, recommend destination, and recommend stimuli experience was measured on 3-item scales using 5-point Likert-type scale. Pre-travel intention to visit items are adapted from studies on destination image (Agapito, Oom do Valle, & da Costa Mendes, 2013; Hahm & Wang, 2011) as well as similar studies on VR and destination marketing (Griffin et al., 2017; Marchiori, Niforatos, & Preto, 2018; Tussyadiah et al., 2018). Intention to recommend destination and stimuli experience items are adapted from studies linking destination image and behavioural intention (Hosany & Martin, 2012; Hosany & Prayag, 2013; Prayag, Hosany, Muskat, & Del Chiappa, 2016; Prayag, Hosany, & Odeh, 2013).

Data Analysis

To measure correlation several within-subject repeated measure analysis of variance (ANOVA) were performed to calculate the efficacy of exposure to the marketing stimuli in evoking positive emotions. One-way repeated-measure ANOVA investigated the differences between all three conditions for all variables (presence, valence, arousal, intention). Repeated-measure ANOVA is a common popular approach with studies utilising similar research instruments (ITC-SOPI, SAM) alongside a within-subjects experiment approach (Gorini, Griez, Petrova, & Riva, 2010; Li et al., 2016; Riva et al., 2007; Villani et al., 2012). As one of

the assumptions needed to perform repeated measures ANOVA is categorical with three or more levels, this study was a good fit, with results measured and compared across three conditions. Post-hoc analysis with Bonferroni correction was used, as seen in multiple studies using the ITC-SOPI (Gorini et al., 2010; Villani et al., 2012) or SAM (Li et al., 2016). Pearson correlation was used to test correlation between variables. At the time of writing, relationship testing, and modelling have yet to be carried out.

Findings

Figures 2, 3, and 4 below illustrates the results of the one-way repeated-measures ANOVA for the first 11 participants. Table 1 illustrates the correlations between constructs across presence, emotion, and intention. As mentioned above, all findings from the full data set will be available at time of presentation.
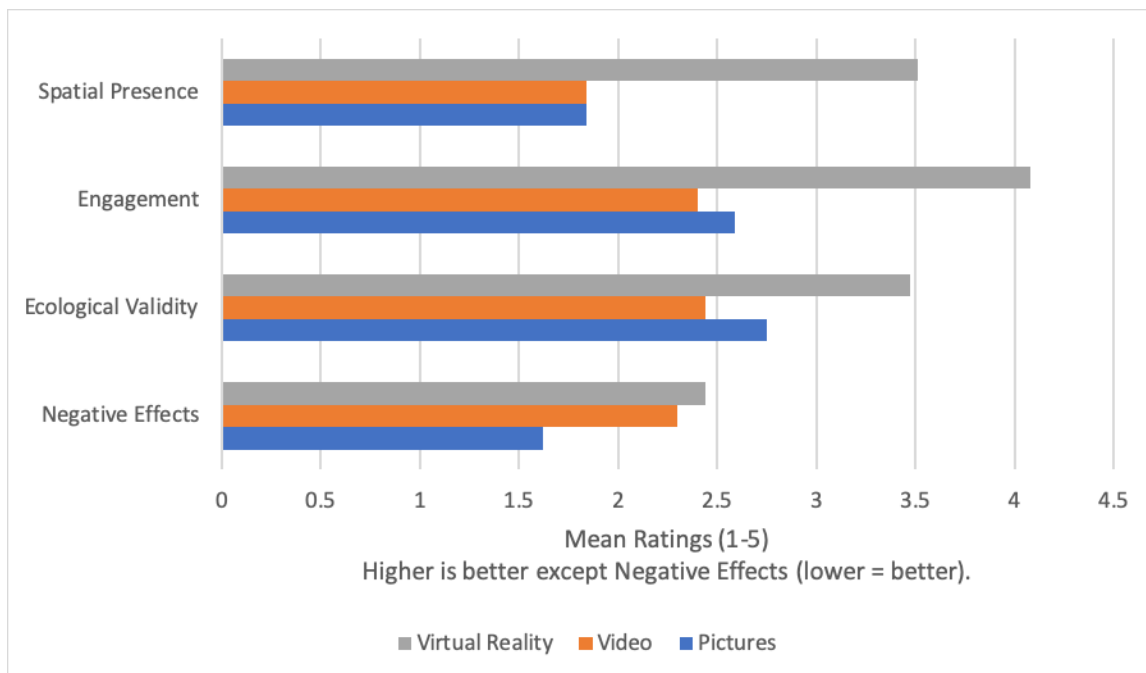

Figure 2. One-Way ANOVA results for Presence Variables.

As shown in Figure 2, one-way repeated measures ANOVA was conducted to determine whether there were statistically significant differences in the presence determinants - Spatial Presence, Engagement, Ecological Validity, and Negative Effects between the 3 stimuli. The

experiment elicited statistically significant changes in spatial presence over the 3 stimuli $F(2, 20) = 50.079$, $p < .001$. Post-hoc analysis with Bonferonni adjustment showed Spatial presence for VR (M = 3.51, SD = 0.55) was significantly higher when compared to pictures (M = 1.84, SD = 0.61) and videos (M = 1.84, SD = 0.52) with mean differences of 1.67, $p < .001$, and 1.66, $p < .001$ respectively.

Same can be said for Engagement, where VR (M = 4.08, SD = 0.43) was significantly higher than pictures (M = 2.59, SD = 0.70) and videos (M = 2.40, SD = 0.75) $F(2, 20) = 24.860$, $p < .001$. Engagement for VR showed increases of mean differences of 1.48 ($p = 0.001$) over pictures and 1.68 ($p < .001$) over videos. There were no statistically significant differences between videos and pictures in terms of Spatial Presence and Engagement.

There was also statistically significant differences in changes to Ecological Validity $F(2, 20) = 8.268$, $p = .002$. VR (M = 3.47, SD = 0.67) was significantly higher than video (M = 2.44, SD = 0.74), but not pictures (M = 2.75, SD = 0.78). Mean difference between VR and video was 1.036 ($p = .013$), and between VR and pictures was 0.727 ($p = .068$).

Negative effects also showed statistically significant differences $F(2, 20) = 8.495$, $p = .002$. Pictures (M = 1.62, SD = 0.35) was lowest followed by video (M = 2.30, SD = 0.80) and VR (M = 2.44, SD = 0.57). Results showed pictures to have significantly lower mean difference compared to video at (-0.68, $p = .046$) and VR (-0.82, $p = .002$).
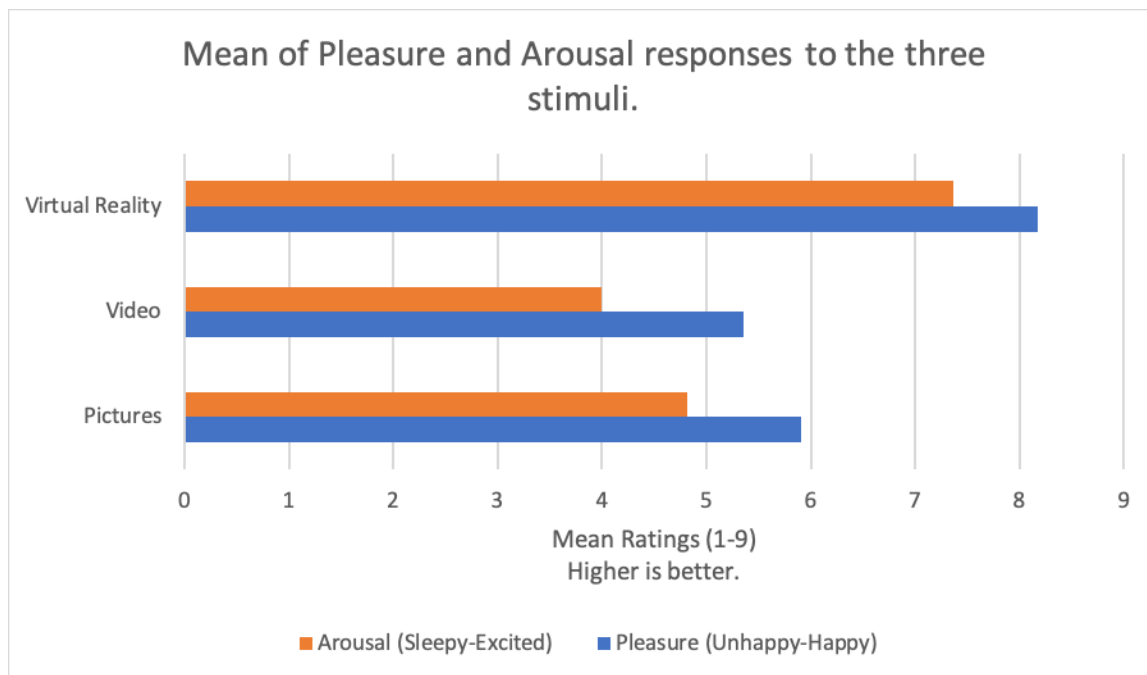
Figure 3. One-way repeated ANOVA results for mean of Pleasure and Arousal responses to the 3 stimuli.

Figure 3 shows the difference in emotional response across the three stimuli. In terms of valence/pleasure, VR (M = 8.18, SD = 0.98) evoked significantly higher responses compared to Pictures (M = 5.91, SD = 1.64) and Video (M = 5.36, SD = 1.43) $F(2, 20) = 12.652$, $p < .001$. Post-hoc analysis with Bonferonni adjustment showed mean differences of 2.27 ($p = .004$) and 2.81 ($p < .001$) respectively. Difference in pleasure response between videos and pictures was not significant. Arousal showed a similar result with VR (M = 7.36, SD = 1.96) performing significantly higher than Pictures (M = 4.82, SD = 1.54) and Videos (M = 4.00, SD = 1.73) $F(2, 20) = 10.009$, $p = .001$. Post-hoc analysis with Bonferonni adjustment showed mean differences of 2.55 ($p = .003$) and 3.36 ($p = .013$) respectively. Difference in arousal response between videos and pictures was not significant.
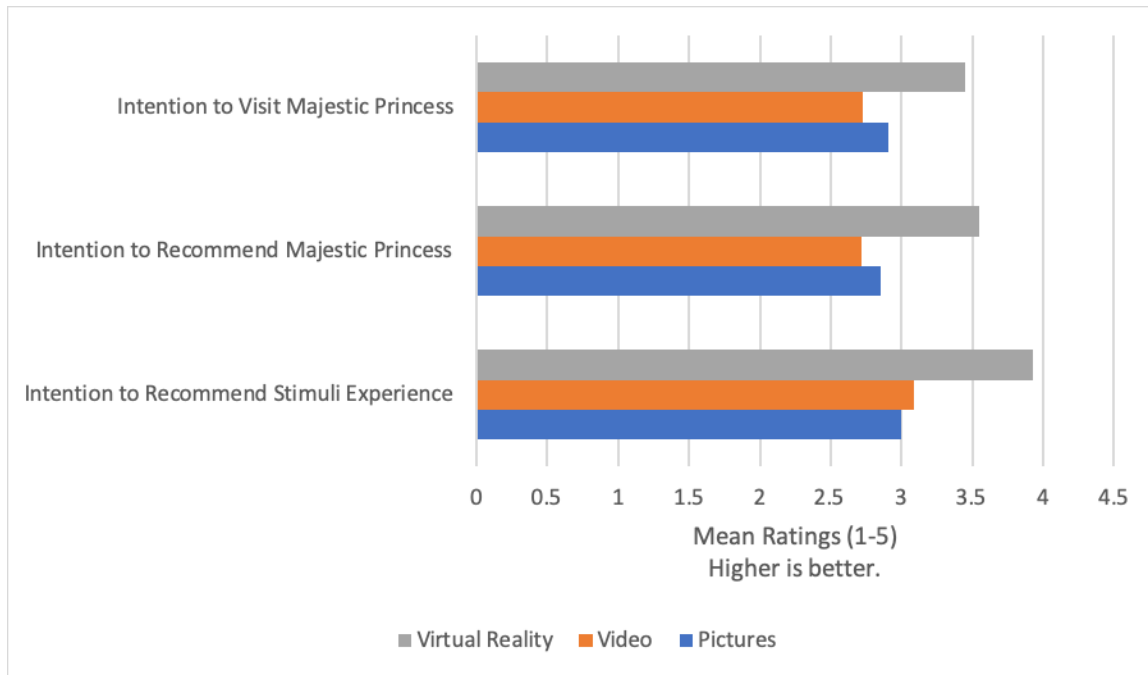
Figure 4. One-way repeated ANOVA results for mean of Intention responses to the 3 stimuli.

Figure 4 shows the mean responses for intention to visit the Majestic Princess, intention to recommend the Majestic Princess, and Intention to recommend the stimuli experience across the three stimuli. Changes in intention to visit the Majestic Princess was not statistically different across the three stimuli $F(2, 20) = 2.966$, $p = .074$. Changes in intention to recommend the Majestic Princess was also not statistically different across the three stimuli $F(2, 20) = 3.046$, $p = .070$. However, changes in intention to recommend stimuli was statistically different across the three stimuli $F(2,20) = 6.07$, $p = .009$. Post-hoc analysis with Bonferonni adjustment showed VR (M = 3.94, SD = 1.08) with a mean difference of .848 ($p = .023$) compared to videos (M = 3.09, SD = 0.84).

Table 1. Pearson Correlation Results Across Constructs of Presence, Emotion, and Intention.

	Arousal	**Valence**	**Intention to Visit**	**Intention to Recommend Cruise**	**Intention to Recommend Stimuli**
Engagement	.725**	.812**	.497**	.619**	.690**

Spatial Presence	.716**	.625**	.444**	.427*	.530**
Ecological Validity	.428*	.334	.196	.191	.453**
Negative Effects	-.017	-.072	.056	.008	-.127
Arousal			.427*	.439*	.456**
Valence			.568**	.616**	.591**
**. Correlation is significant at the 0.01 level (2-tailed).					
*. Correlation is significant at the 0.05 level (2-tailed).					

As seen in Table 1, there was statistically significant ($p < .001$), strong positive correlation between Engagement and Arousal ($r = .73$), Valence ($r = .81$), Intention to Recommend Cruise ($r = .62$), Intention to Recommend Stimuli ($r = .69$), and Intention to Visit ($r = .50$, $p = .003$). Spatial Presence had statistically significant, strong positive correlation ($p < .001$) with Arousal ($r = .72$), Valence ($r = .63$), and Intention to Recommend Stimuli ($r = .53$); and moderate positive correlation with Intention to Visit ($r = .44$, $p = .010$) and Intention to Recommend Cruise ($r = .43$, $p = .013$).

Ecological Validity had statistically significant, moderate positive correlation with Arousal ($r = .43$, $p = .013$), and Intention to Recommend Stimuli ($r = .45$, $p = .008$).

Arousal had statistically significant, moderate positive correlation with Intention to Visit ($r = .43$, $p = .013$), Intention to Recommend Cruise ($r = .44$, $p = .011$), and Intention to Recommend Stimuli ($r = .46$, $p = .008$).

Lastly, Valence had statistically significant, strong positive correlation ($p < .001$) to Intention to Visit ($r = .57$), Intention to Recommend Cruise ($r = .62$), and Intention to Recommend Stimuli ($r = .59$).

Conclusion

Based on the preliminary findings, it is clear that Spatial Presence, Engagement, Ecological Validity, and Negative Effects were all higher for VR compared to pictures and videos. These results signify higher presence levels for VR (Lessiter et al., 2001). In terms of emotional response, in line with previous research in cyberpsychology, psychiatry and ICT, VR was also elicited significantly more intense emotional responses, as illustrated with the higher valence and arousal scores. However, in terms of intention to visit and recommend the cruise, whilst VR performed better than pictures and videos, the difference was not statistically significant. Interestingly, intention to recommend the VR experience scored significantly higher than pictures and videos. This suggests that across the board, even where participants had no intention to visit or recommend the cruise, they still intended to spread word of mouth about the Majestic Princess VR experience.

In terms of theoretical findings, Engagement proved to be the most important presence determinant. This is in line with existing presence research which suggests that when participants are more involved, and the experience is more interactive, emotional response and intention increases as well. Using VR, participants could look at what they wanted, when they wanted, and how they wanted. To an extent, this also explains the finding where pictures outperformed videos, as participants could engage and interact with the pictures instead of just watching the video with no input. Spatial Presence, or Immersion, was also vital as a variable. When participants were more immersed in the experience, emotional response and intention saw increases as well. In VR, because participants could not see the 'real world' their

immersion and attention would not be broken; compared to pictures and videos. The ability of VR to replicate hand, head, and body movements in the experience also contributed to the feeling of 'being there' or feeling like they had visited the cruise ship, albeit virtually. Ecological validity, or how realistic the virtual environment is deemed, had only moderate positive correlation to arousal and intention to recommend stimuli. Whilst the graphics of the environment felt more realistic in VR, the lack of correlation to valence and intention can be explained by the material, as all three stimuli experiences utilised the same base computer-generated graphics. This finding presents an avenue for future research to replicate this study comparing real-world images and videos of the cruise ship to VR, instead of a fully computer-generated package. Alternatively, as the graphical capabilities of VR hardware continue to improve, findings could be different. The lack of significance for negative effects can be explained through the short amount of time participants experienced all three stimuli. Five minutes using VR was unlikely to cause cybersickness. Again, replicating this study with a bigger, longer VR experience may result in differing findings. Lastly, as previously suggested in destination marketing research, more intense emotional responses correlated positively with intention to visit, recommend the cruise, and recommend the stimuli.

In conclusion, this study suggests that the higher presence levels of VR compared to pictures and videos correlate with more intense emotional responses and higher intention. Practically, for destination marketers, the results suggest that adding VR to the marketing mix could be more effective than just relying on pictures and videos. In accordance to previous research, the extent of effectiveness relies upon how interactive, engaging, and immersive the marketing material is. As seen above, whilst intention to visit did not see a statistically significant difference, having a VR experience could generate interest through word of mouth. The specific aspects of the experience which could influence presence, emotion, and intention will be an ongoing avenue for future research; as the technology continues to advance and

evolve. However, due to the small sample size, generalisations and recommendations should not be made at this point. More concrete and significant insights will be provided once the sample size is sufficient for relationship testing and modelling.

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