Breaking the psychological distance: the effect of immersive virtual reality on perceived novelty and user satisfaction

1. Introduction

The integration of digital and physical worlds, known as "phygital", has led to the emergence of hybrid consumption experiences (e.g., virtual reality, augmented reality, digital concierge services) (Batat, 2019). Virtual reality (VR, referred as VR hereafter) is used by real estate companies to connect overseas and domestic consumers to their available properties. In recent years, investors have shown a keen interest in overseas real estate. Residential properties in cities such as Vancouver, Berlin, Los Angeles, and Shanghai are in great demand among international investors (PwC & Urban Land Institute report, 2018). Therefore, real estate companies are utilizing VR technology to make the discovery and viewing of properties more effective. For example, Sotheby's International Realty's website gives VR headset users access to the full walk-through experience of a property through an iPhone, iPad or Android on demand.

A high quality phygital experience using VR may reduce the perception of psychological distance associated with a property located overseas. However, consumer response to phygital experiences vary. While some consumers find phygital experiences unique and stimulating, others reject these experiencse as pointless technological promotions (Batat, 2019). There is also a lack of knowledge regarding what makes a phygital experience valuable to a consumer.

Biocca (1992) is defined VR as "an environment created by a computer or other media in which the user feels present" (pp. 5-6). There are two primary types of VR-based experiences with different levels of immersion—*non-immersive* and *immersive* VR. In non-immersive VR, where immersion ranges from none to low, (Kalawsky, 1996), users interact with a 3D

environment displayed on a screen through an interface (mouse, touchscreen, touchpad, or handheld control) while seated in front of a computer (Parong & Mayer, 2018; Robertson et al., 1993). Non-immersive VR does not isolate users from the real world. Content is displayed via a computer screen, and interaction with the virtual environment occurs through familiar input methods (Costello, 1997). This is the least expensive VR technology and does not require wearable equipment. An example of non-immersive VR is a 2-minute 360-degree VR video of Mercedes-Benz's 2017 GLS sport utility vehicle, available on the company's Instagram account (Graham, 2018).

In contrast, with immersive VR, the sense of immersion ranges from medium to high (Kalawsky, 1996). Users feel completely engaged in the virtual environment and do not register interactions with the real world (Witmer & Singer, 1998). For immersive VR, the user typically wears a head-mounted display (HMD) controlled by a computer and moves through a 3D virtual environment (VE). HMDs range from high-end devices, such as HTC Vive, Oculus Rift, to low-cost Google Cardboard glasses. Immersive VR features user-centered, head-tracked viewing with wide-angle stereoscopic vision, interactive controls, and audiovisual immersion. Immersive VR allows consumers to navigate within a virtual world by moving their heads, enabling realtime interactions with the environment. The consumer can experience a three-dimensional (3D) walkthrough of a local property, or, just as easily, of an international property in New York in real-time, from home. The higher interactivity and immersion levels of immersive VR can make the experience of viewing a property virtually feel more novel compared with non-immersive VR. A higher perceived novelty of the experience can lead to higher user satisfaction. Additionally, immersive VR may reduce the effect of psychological distance associated with considering purchase of property located overseas.

Previous research in VR (e.g., Van Herpen et al., 2016; De Gauquier et al., 2018; Van Kerrebroeck et al., 2017) focused mainly on comparing immersive VR to 2D pictures or videos.

There is little research comparing the effect of different levels of immersion in VR. Exceptions include Shin and Biocca (2018), which compared immersive VR and non-immersive VR. Furthermore, studies investigating the boundary condition determining the effectiveness of VR experiences are also lacking. Exceptions include Van Kerrebroeck et al. (2017) and Shin and Biocca (2018), which included moderators such as perceived crowding and immersion tendency.

In response to such research gaps in the literature, the current study investigates how using immersive VR versus (vs.) non-immersive VR technology to promote a particular property can influence user experience. Specifically, our research focuses on investigating how showing a property (i.e., a condominium) using immersive VR affects user satisfaction relative to showing it using non-immersive VR. We investigate underlying psychological mechanisms to identify a possible mediating variable and argue that using the stimuli of immersive VR (vs. non-immersive VR) to show a property increases user satisfaction through the mediator—perceived novelty—due to higher telepresence and immersion. Additionally, we examine the possible moderated mediation effect by including a boundary condition (i.e., the moderating variable—psychological distance).

According to construal-level theory (CLT) framework (Trope & Liberman, 2010), property located in a remote geographic location will be perceived as more psychologically distant, while property located nearby will be perceived as psychologically proximate. We theorize that for real estate located at a distance (vs. nearby), presenting the property through immersive VR technology will have a positive effect on user satisfaction. We argue that immersive VR is more effective for showing a residential condominium located at a distance (e.g., overseas) vs. one located nearby (e.g., the same city). We posit that the psychological distance associated with the condominium is a function of its geographic location, and psychological distance will moderate the indirect effect. Based on CLT, Darke et al. (2016)

showed that a physically distant retail store contributed to psychological distance. In accordance with this previous research (Darke et al., 2016) we believe that due to geographic distance, users will construe (i.e., mentally represent) a condominium located at a physical distance (i.e., overseas) as more psychologically distant (i.e., abstract). Conversely, users will construe a condominium located locally as psychologically proximate (i.e., concrete).

Our results have theoretical implications for VR, customer experience in phygital, and CLT literature, and have managerial implications for strategic marketing. The findings of our research can be used by marketers to design valuable customer experiences in phygital settings.

Our paper is organized as follows. First, we offer a literature review and our theoretical frameworks. Second, we formulate our hypotheses. Third, we describe the empirical methodology, discuss the analyses, and the results. Finally, we present theoretical and managerial implications, limitations and future research, conclusions.

2. Literature Review and Theoretical Framework

2.1 Virtual Reality (Immersive and Non-immersive VR)

VR technology is defined by McGreevy (2014) as "a display and control technology that can envelop a person in an interactive computer-generated or computer-mediated virtual environment. [It] immerses the user in artificial worlds that might otherwise be inaccessible due to distance, scale, time, or physical incompatibilities" (p. 163). Through VR, users are dropped into a scene and feel present within it (Shin, 2018).

Immersion refers to "the extent to which a user is isolated from the real world" (Guttentag, 2010) and is a crucial to VR's functionality. In the context of VR, immersion refers to *spatial immersion* — the perception of being physically present in a non-physical world and interacting with the environment in meaningful ways. In an engrossing virtual environment, users of VR systems are surrounded with images, sound, or other stimuli (Shin, 2017).

Product visualization and spatial perception are both higher in immersive VR than in non-immersive VR (Zeng & Richardson, 2016). Additionally, immersive VR provides consumers with a higher locus of control than non-immersive VR because it permits them to discover and explore products and spaces autonomously. For example, the Marriott hotel chain launched an immersive VR travel experience allowing users to travel to different destinations via VR headset. Users could explore the scenery of the location, while feeling the breeze and the sun (Mandelbaum, 2015). In sum, users of immersive VR can embody an experience by viewing while receiving perceptual cues (Shin & Biocca, 2018). Embodied experience creates the sensation of having had the experience (Shin, 2018). Immersive VR experiences induce cognitive absorption (i.e., the feeling of presence and engagement) which is lacking in non-immersive VR experiences (Zeng et al., 2016).

The terms *immersion* and *presence* are used interchangeably; however, immersion is more subject to individual preference and situational context. A correlation exists between users' personal traits and immersion in VR (e.g., Shin 2018; Shin & Biocca, 2018). In VR, the interpretation of immersion is highly dependent on users' traits and contexts, and the operability of immersion is strongly determined by the users' own cognition and intentions (Shin & Biocca, 2018). Therefore, the sensation of immersion will vary for individuals, in addition to the variation in immersion levels between immersive and non-immersive VR. Presence, on the other hand, is considered a state of mind (Jennett et al., 2008).

Presence is a direct experience of reality, while *telepresence* is a mediated perception of direct experience (Steuer, 1992). In VR, the user experiences telepresence in the real or simulated environment. When perception is mediated by VR, a user perceives two separate environments. Telepresence occurs when the perception mediated by VR takes precedence over the unmediated perception (Steuer, 1992). Steuer identifies *interactivity* and *vividness* as the two dimensions across which VR technology varies. These variables are the determinants

of telepresence.

These two dimensions (interactivity and vividness) are stimulus-driven and depend entirely on the technological structure of the medium. The contributions of these variables are not subject to individual differences. In other words, these variables will determine similar (if not identical) consequences across a range of users despite individual differences.

For Steuer (1992) "Interactivity is the extent to which users can participate in modifying the form and content of a mediated environment in real time" (p. 84). The three factors that determine interactivity are *speed* (rate at which input can be assimilated into the mediated environment); *range* (number of actions possible at any given time); and *mapping* (a system's ability to map its controller to changes). (For more detail, see Steuer, 1992). Any increase to the level of interactivity in VR technology should result in heightened levels of telepresence. In immersive VR, these factors are present at higher proportions than in non-immersive VR, resulting in higher levels of telepresence.

Steuer (1992) defines *vividness* as "the representational richness of a mediated environment as defined by its formal features; that is the way in which an environment presents information to the senses" (p. 81). Vividness is comprised of breadth and depth. *Breadth* is the number of sensory dimensions simultaneously presented (Steuer, 1992, p. 11) and 'depth' is the "quality and resolution of the presentation" (Fortin & Dholakia 2005, p. 389). Vividness is considered a contributor to telepresence, so increasing the levels of vividness in a VR technology should heighten levels of telepresence. Vividness is higher in immersive VR than in non-immersive VR, so immersive VR offers higher levels of telepresence. Since interactivity and vividness contribute to higher levels of telepresence in immersive VR, and Walsh and Pawlowski (2002) make the case that vividness can be interchangeably referred to as immersion. Based on technological properties of the medium, we can conclude that despite individual user difference, immersion is higher among users of immersive VR than among

users of non-immersive VR.

Previous studies conducted surveys, experiments and interviews to examine the effectiveness of VR on user experience (e.g. Pantano & Servidio, 2012; Papagiannidis et al., 2013; Papadopoulou, 2007). Sihi (2018) explored how VR technologies influence each stage of the decision-making process in a home-buying context. Interviews with buyers and realtors suggested that, in such a high-involvement purchase decision context, VR technologies enhance the home-buying experience by helping consumers gather information and insight related to esthetics and spatial dimensions. However, the difference of the effectiveness between different VR technologies is not yet clear. Table 1 summarizes recent studies on the effectiveness of VR across different fields. Most experiment-based studies employ a single factor between-subject factorial design and suggest that using VR can enhance realism (e.g., Van Herpen et al., 2016); certain dimensions of brand personality (e.g., De Gauquier et al., 2018); and attitude and intention (e.g. Van Kerrebroeck, et al., 2017; De Gauquier et al., 2018).

2.2 Perceived Novelty and User Satisfaction

Novelty is the degree of newness (Miettinen, 2006). Terms like *curiosity*, *adventure*, *new*, and *different experience* are used to describe novelty (Crompton, 1979). Novelty does not mean new knowledge, but specifically, new experience. As stated by Crompton (1979), "novelty [results] from actually seeing something rather than simply knowing of it vicariously" (p. 419). The concept of novelty has been applied in realms like tourism, information technology (IT), product, and service innovation (Nieto & Santamaria, 2007). For example, in the context of tourism, novelty refers to thrill, change from routine, boredom alleviation, and surprise (e.g., Bello and Etzel, 1985; Lee & Crompton, 1992). In IT, novelty refers to the degree to which a user perceives an innovation to be a new and exciting alternative to existing technology (Wells et al., 2010).

Due to the higher degree of vividness and interactivity when visualizing an object using immersive VR, users may perceive their experience as original, different, exciting, new, or unusual. In contrast, the lower degree of vividness and interactivity associated with visualizing an object using non-immersive VR, may fail to generate user perceptions of newness and excitement. Consumer response to the stimuli of immersive and non-immersive VR may be subject to Optimum Stimulation Level (OSL) theory. OSL suggests that organisms (including humans) prefer a particular level of stimulation (Hebb, 1955). Individuals with high OSLs have a higher need for environmental stimulation and are more likely to explore new stimuli. Low OSL individuals are more comfortable with familiar situations, and less likely to explore new, unusual stimuli. So, it seems likely that high OSLs will respond to the stimulus of immersive VR, and low OSLs will withdraw from the stimulus. OSL has relationships with certain personality traits such as uncertainty avoidance, and with general exploratory tendencies in the consumer context, such as risk aversion (for more, see Raju, 1980). Individual differences across those variables can result in a difference between high OSL and low OSL individuals. Studying individuals' responses to novelty stimulus requires controlling for the effect of those variables (to prevent response bias).

The stimulus of immersive VR is unusual in nature so can cause schema incongruity, making it difficult for users to readily categorize it, resulting in an increase in affect or arousal—for example, emotion (Mandler, 1982; Fiske, 1982). Prior research (Cox & Locander, 1987) has also indicated that perceptions of novelty can be framed as affective.

Perceptions of novelty within a specific technology—like image interactivity in immersive VR—can lead to enhanced pleasure, experiential value, and enjoyment (e.g., Fiore et al., 2005a; Fiore et al,, 2005b). Flow theory suggests that user enjoyment could be a determining factor in user satisfaction. Flow is defined (Csikszentmihalyi, 1990) as "the state in which people are so intensely involved in an activity that nothing else seems to matter; the

experience itself is so enjoyable that people will continue to do it even at great cost, for the sheer sake of doing it" (p. 4). In the context of immersive VR, flow experience is a psychological state encompassing enjoyment, cognitive absorption, and loss of a sense of time and space (e.g., Kim & Ko, 2019; Shin, 2017; Shin, 2018). In a computer-mediated environment such as virtual reality spectatorship (VRS) for sports media consumption, flow experience positively influences user satisfaction. User satisfaction is a function of a set of discrete experiences (i.e., cognitive absorption, time distortion, and enjoyment) (Kim & Ko, 2019).

In the context of a human-algorithm interaction, such as news recommendation systems, user satisfaction refers to a positive affect (Shin, 2020). In technology acceptance literature, positive affect can be a significant factor of user experience (Shin, 2010). In the context of online-shopping, retail websites with higher-level interactivity increased telepresence and positively impacted online shoppers' satisfaction (Dholakia & Zhao, 2009). *User satisfaction* is defined as pleasurable fulfillment (Oliver, 1997). In the context of VR, user satisfaction is enjoyment derived from consumption, as well as the positive evaluation given to the experience (Hunt, 1977).

2.3 The Moderating Role of Psychological Distance

In the CLT framework, psychological distance is related to physical distance and is egocentric. The reference point of psychological distance is the self in the here and now, so objects removed in space from the self are perceived as psychologically distant (vs. psychologically proximate) (for more, see Trope & Liberman, 2010).

People transcend the here and now by forming abstract mental representations of distal objects. Mental representations are arranged along a vertical continuum of abstraction, from low to high. Higher-level construal involves constructing relatively abstract mental representations, whereas lower-level construal involves constructing more concrete

representations of an object. The mental representation of a bowl of pudding at a lower level of abstraction might involve representing it as rice pudding with strawberries, while construing the same bowl of pudding at a higher level of abstraction might involve representing it as a dessert (Soderberg et al., 2015).

Because psychological distance is correlated with spatial distance in CLT, geographic distance influences whether mental representations include high- and low-level features of an object, which in turn can affect judgment and action (Fujita et al., 2006). A psychologically distant object constitutes an *abstract* (i.e., high-level) construal, whereas a psychologically proximate object constitutes a *concrete* (i.e., low-level) construal. Thus, a property in a faraway geographical location will be construed as abstract, and one that is nearby, as concrete.

2.4 Theoretical Framework

The Elaboration-Likelihood Model (ELM) can also be a theoretical lens for this inquiry. ELM posits decision making as guided by a dual process, with attitudes and behavior changes occuring via two different routes of information processing (i.e., *central*, or *peripheral* routes) (Petty & Cacioppo, 1986). We draw the conceptual framework of our study from a previous study done by Shin (2021) in the context of user experience with chatbot news.

Based on ELM, Shin (2021) used an algorithmic information-processing perspective to explain human-chatbot interaction and attitude towards conversational journalism (CJ). The research showed that "algorithmic stimuli are processed in two-step flows of interaction: first users evaluate humanness and other non-functional quality based on heuristics, and second based on the first evaluation, users then evaluate the functional quality of algorithms" (Shin, 2021, p. 20). When provided with human explanations, users apply a simplified form of quality judgment for non-functional quality information of algorithmic features. Using mental shortcuts (i.e., heuristic evaluations), users establish trust. They then use systematic processing

to assess chatbot functions. Based on conclusions drawn from these careful evaluations, users form attitudes. Following this reasoning, we believe that when provided with technological features of vividness and interactivity in immersive VR, users will make similar heuristic evaluations of the technology. Using mental shortcuts, users will perceive immersive VR as a novel experience. They will then use systematic processing to make careful evaluations about immersive VR which will formulate their attitudes (i.e., user satisfaction).

3. Hypothesis Development

Based on the literature review discussed in section 2, hypotheses are developed to understand the effect of different VR technologies on users' satisfaction of a virtual real-estate tour. The first hypothesis pertains to the effect of different VR technologies on users' satisfaction. The second hypothesis pertains to this effect through the mediating variable (perceived novelty).

When users visualize an object using immersive VR, they generally interact with the object in a mediated environment using an HMD. In contrast to the stimuli of non-immersive VR, we believe that showing a condominium with immersive VR will increase users' satisfaction. Specifically, we posit that the experience of showing a condominium with immersive VR (vs. with non-immersive VR), will increase user satisfaction.

Due to the higher degree of immersion/presence, including vividness and interactivity associated with an immersive VR (vs. a non-immersive VR) experience, users will find viewing the condominium with the stimuli of immersive VR as original, new, and unusual. Novelty of product or innovation can foster positive affective reactions such as excitement (e.g., Cox et. al., 1987; Wells et al., 2010). Perceptions of novelty within a specific technology can lead to enjoyment (e.g., Fiore et al., 2005a; Fiore et al., 2005b). Novelty has a positive influence on users' satisfaction (Lee et al., 2015; Lee et al, 2016). Therefore, we believe that the higher

perceived novelty of viewing the condominium with immersive VR will lead to greater user satisfaction. We postulate that, relative to non-immersive VR, immersive VR will have stronger positive effect on users' satisfaction through perceived novelty. Specifically, we hypothesize that:

H1: Showing the condominium through immersive VR (vs. non-immersive VR) increases users' satisfaction.

H2: The positive effect of immersive VR (vs. non-immersive VR) on users' satisfaction is mediated by perceived novelty.

The third hypothesis pertains to the effect of the moderating variable (i.e., psychological distance) on the mediation model (see Figure 1, Appendix).

Drawing from CLT, we hypothesize that showing a property with immersive VR technology can break the perception of psychological distance associated with a faraway property. This is because when a consumer views the property using immersive VR, they have a direct experience due to higher telepresence. Moreover, since vividness is high with immersive VR, the consumer can construe the property as concrete as opposed to abstract. Due to higher telepresence among users, the experience of viewing a psychologically distant property (i.e., a condominium situated overseas) using immersive VR will generate an extraordinary and exciting experience. Users may perceive the experience as novel. Previous research on cultural distance[1] (Baek & Kim, 2016) further strengthens our claim that viewing a condominium located overseas using immersive VR will be perceived as novel, and that the perceived novelty will generate enjoyment among users. As mentioned in section 2.2, enjoyment linked to perceived novelty leads to higher user satisfaction. In contrast, viewing an

[1] For example, in the context of culturally distant products such as foreign dramas, the large cultural distance increases the product's perceived novelty among local audiences due to newness and unfamiliarity. The higher novelty perception of foreign dramas among local audiences results in more enjoyment.

overseas property using non-immersive VR will not reduce psychological distance. The absence of a direct experience results in lower telepresence and vividness, and the property will be construed as abstract, the experience as less novel. Furthermore, since the perception of psychological distance is less prominent for a nearby property (i.e., a local condominium), viewing the condominium through immersive VR should have no significant effect on perceived novelty. As a result, the mediation model will not be valid due to a lack of perceived novelty (see Figure 1, Appendix). Specifically, we hypothesize:

H3: The mediation effect is moderated by psychological distance.

H3a: For the condominium at a greater distance, showing the condominium through immersive VR (vs. non-immersive VR) increases users' satisfaction through perceived novelty.

H3b: For the condominium at a smaller distance, showing the condominium through immersive VR (vs. non-immersive VR) will not increase users' satisfaction through perceived novelty.

4. Methods

4.1 Participants

One hundred and sixteen participants were recruited, each awarded 60 RMB upon task completion. The mean age of participants was 23.5 (SD = 1.51); 79 (68%) of the participants were female.

4.2 Procedure

A 2 (VR type: immersive vs. non-immersive) by 2 (Psychological distance: high vs. low) between-subject factorial experiment was conducted in the Future Media Lab at a University (see appendix for the lab) in Shenzhen, China. Many real estate companies use both

immersive and non-immersive VR. Since VR has been widely used in the Chinese real estate industry, we believe conducting such a study in China will have great practical implications.

Participants were told that they were going to view a condominium from a (fictitious) real estate company called Dulcet. We manipulated the psychological distance by adapting the location of the condominium. Participants were told the condominium was in Shenzhen (psychological proximity condition) or Sydney (psychological distance condition). We conducted a pilot study (M = 54, N_{female} = 39, M_{age} = 24.8, SD = 3.50) to check if participants in Shenzhen will have thoughts of a lower construal level about a condominium in Shenzhen (vs. Sydney). Following the suggestion of prior studies (e.g., Cacioppo, von Hippel, & Ernst, 1997; Peetz, Wilson, & Strahan, 2009), we asked participants to picture a condominium of 100 m^2. Half of the participants were told that this condominium was located in Shenzhen while the other half were informed that it was in Sydney. Next, participants were told to list their thoughts about it. We also asked participants how distant/far away they felt from this condominium (r = .74). Coders classified the thoughts into three categories (low construal level, mixed construal level, high construal level). For example, if the participant described the condominium as luxurious, stylish, bright, pricy, this thought will be classified as high construal level. If a condominium was described as having a big garden, two bathrooms, clean toilets, it will be marked as low construal level. If a thought contained both abstract and concrete description, we marked it as mixed construal level. The results showed that those in the Shenzhen condition described the condominium in a lower construal level way (low: 21, mixed: 2, high: 4) than those who were in the Sydney condition (low: 8, mixed: 10, high: 9). A chi-square test showed that there was significant difference between these two conditions ($\boldsymbol{x}^2$ = 13.1, df = 2, p < . 001). In addition, participants in the Sydney condition perceived the condominium as more distant than those in the Shenzhen condition (M_{Sydney} = 5.35, SD = 1.78, $M_{Shenzhen}$ = 4.16, SD = 1.83, t(52) = -2.41, p = .02).

The pilot study suggested that the manipulation of psychological distance was successful.

Next, participants could examine the condominium through an immersive or non-immersive VR system called Focus360. Each participant was allowed to navigate in the system for 2-3 minutes.

4.3 Stimuli

Participants were shown a condominium through an immersive or non-immersive VR device. The VR content was a virtual condominium developed by Focus 360 (www.focus360.com). Focus 360 creates "virtual model homes" for the real estate industry (Focus 360, 2018). For immersive VR, participants wore a pair of VR glasses through which they could see the condominium. Participants could move and turn their heads around (or up and down) and could change rooms by staring at a certain button. For non-immersive VR, participants examined the condominium via a computer, which allowed a 360-degree view. By dragging the interactive page, participants could change the angle of view. Participants could click the same button to change the room (e.g., living room, loft, and kitchen). The condominium shown in both conditions was the same (see appendix for the stimuli). The only difference was the type of VR (immersive vs. non-immersive).

4.4 Measures

We measured perceived novelty, and users' satisfaction of the real estate virtual tour. The scale to measure perceived novelty was adopted from a study by Argo et al. (2010). The scale contained five items (see Table 2); the participants rated the item on a seven-point Likert scale, from 1 (strongly disagree) to 7 (strongly agree). Satisfaction was assessed using a 6-item Likert scale extracted from a study by Chin et al. (1988). In this study, we also controlled for

participants' personality traits, uncertainty avoidance, and risk aversion because consumers' response to the stimuli of immersive and non-immersive VR may be subject to optimum stimulation level (OSL) theory. Uncertainty avoidance was measured using a four-item scale originated by House et al. (2004). Risk aversion was assessed using a scale developed by Sharma (2010).

5. Results

Data were analyzed using model 4 (Bootstrap samples:10,000) in SPSS macro PROCESS 3.3 (Hayes, 2018). The independent variable was the type of VR; the mediating variable was novelty. The dependent variable was satisfaction. Uncertainty avoidance and risk aversion were treated as covariate (see Figure 2 for the statistical model and the label of the path coefficient).

The results showed that individuals who were in the immersive VR condition had higher perceived novelty than those in the non-immersive VR condition ($b = .50$, $SE = .24$, $t = 2.08$, $p = .039$) (see Table 3 for the mean difference of the type of VR on perceived novelty). Therefore, hypothesis 2 was supported. Next, compared to non-immersive VR, immersive VR had a positive indirect effect on satisfaction through perceived novelty ($b = .21$, $SE = .11$, 95%-CI [.0101, .4479]). Additionally, we observed a negative direct effect on satisfaction ($b = -.45$, $SE = .14$, 95%-CI [-.7320, -.1806]). Therefore, hypothesis 1 was not supported. This implied that if the effect of perceived novelty was suppressed, immersive VR can have a negative effect on user satisfaction. Further analysis showed that the total effect of immersive (vs. non-immersive) VR on satisfaction was not significant ($b = .25$, $SE = .17$, $t = -1.42$, $p = .16$). As such, hypothesis 2 was confirmed (see Figure 3 for path coefficients).

The results first suggested that the interaction effect of the VR type and distance on user satisfaction was not statistically significant ($b = .64$, $SE = .34$, $t = 1.90$, $p = .06$). Next, a

moderated mediation analysis was conducted using model 7 (Bootstrap samples: 10,000). The results revealed that the mediation effect (path a) was further moderated by psychological distance (b = .43, SE = .23, 95%-CI [.0207, .9313]) (see Table 4 for the mean difference between the two types of VR under small vs. large psychological distance conditions).

For a condominium located in a psychologically distant area, immersive VR had a positive effect on perceived novelty, which in turn led to higher satisfaction (b = .49, SE = .42, 95%-CI [.1104, .8204]). However, for a condominium in a psychologically proximate place, such a mediation model was not valid (b = -.005, SE = .13, 95%-CI [-.2808, .2536]). More specifically, the effect of immersive VR on perceived novelty was not different from non-immersive VR (see Figures 4 and 5 for path coefficients). Therefore, hypothesis 3 was supported. For the comparison between the direct effect (c') and indirect effect (a*b), see Figure 6 for the visual representation. According to Figure 6, both the indirect and direct effects of immersive VR on satisfaction depended significantly on psychological distance.

6. Discussion

Drawing on the algorithmic information-processing perspective based on ELM, and CLT, we demonstrated the effect of interactive tools (i.e., immersive and non-immersive VR) on consumer's phygital experience in the context of the real estate industry (i.e., H1 & H2). Our results indicated that compared to non-immersive VR, immersive VR increases perceived novelty, thereby enhancing user satisfaction. Furthermore, our results implied that if the effect of perceived novelty was suppressed, immersive VR can have a negative effect on user satisfaction. In sum, our results indicated that the stimuli of immersive VR is perceived novel, and based on previous research (Otto, 1997), when an experience is perceived new and different, it is also perceived more enjoyable. Consequently, our findings support the tenet that consumers' whole immersion results in pleasurable consumption experiences (e.g., Batat 2019;

Caru & Cova, 2003). Specifically, our results indicated that the stimuli of immersive VR triggered a positive affective response and based on previous works (e.g., Westbrook & Oliver, 1991; Wirtz et al., 2001), such response should increase satisfaction. Accordingly, our results found a positive effect of novelty on satisfaction and this result is consistent with previous findings (e.g., Lee, et al., 2015; Lee, et al., 2016). For H3, our results indicated that the mediation effect is moderated by psychological distance. Specifically, our study found that showing a property via immersive VR had a positive effect on perceived novelty, which in turn led to higher satisfaction only when that property is perceived as more psychologically distant (vs. proximate). Our study expands the CLT literature (e.g., Darke et. al., 2016) by linking psychological distance to the geographic distance of property.

7. Implications

7.1 Theoretical Implications

The current study makes several theoretical contributions: The study compares the effect of interactive tools on consumer experience in a phygital environment. There is lack of research comparing different levels of immersion in VR in phygital settings, and this study is among the earliest attempts. The results expand the literature on examining the effect of VR vs. other media (e.g., Van Herpen et al., 2016; De Gauquier et al., 2018). The results highlight that the stimuli of immersive VR triggers a positive affective response (i.e., perceived novelty) which is pleasurable. Although the argument that using digital technologies in consumption experiences can improve the hedonistic aspect of customer experiences has been examined in literature (e.g., Punj, 2012; Chaffey & Ellis-Chadwick, 2012), there is lack of empirical support on this in the phygital context. Our study contributes to phygital literature on understanding

consumer experience by pinpointing how immersive VR (vs. non-immersive VR) increases user satisfaction through the mediator of perceived novelty in the context of real estate. Although customer experience theories on consumer behavior (e.g., Addis & Holbrook, 2001; Holbrook, 1999) and on marketing (Schmitt, 1999) have been applied across varied sectors (e.g., luxury, tourism), there is little empirical research examining customer experience in phygital contexts in the real estate sector. To our knowledge, our study is among the first. Drawing on the algorithmic information-processing perspective from ELM, our study examines the psychological mechanism underlying the customer experience in the phygital context in real estate consumption. Our study extends Batat's (2019) work on allocentric drivers of customer experience (i.e., immersion) in real estate consumption. We demonstrate that in the pre-purchase stage of real estate, viewing a property using immersive VR (vs. non-immersive VR) results in complete immersion, triggering the affective response of perceived novelty, which is pleasurable (i.e., fun) (Holbrook, 1999) and has a positive influence on user satisfaction. Our study extends Schmitt's (1999) customer experience theories on marketing to the real estate sector by implying that showing the property using immersive VR appeals to consumers' senses and can become a valuable phygital experience. Our study contributes to the CLT literature (Darke et. al., 2016) by generating a new theoretical insight into the process mechanism of user experience in immersive (vs. non-immersive) VR. We use tests of moderation to examine how geographic distance that is linked to psychological distance can affect users' satisfaction while viewing a property through immersive VR (vs. non-immersive VR).

7.2 Managerial Implications

Our research has several managerial implications. With the democratization of technology, and proliferation of interactive tools, it is crucial for marketing managers to create

memorable phygital experiences (Batat, 2019). Our research contributes to strategic marketing by demonstrating how phygital experience, in the context of real estate consumption, can create value for consumers. Marketers can use our findings to design valuable customer experience in phygital settings. Our study is one of the first to study the applications of VR, in the context of real estate industry's phygital environment. Specifically, we examine the underlying psychological mechanisms of using VR for viewing property on user satisfaction.

This study suggests how marketers in the real estate industry can employ the right type of VR technologies for their target markets: For consumers who are interested in a distant property, immersive VR can increase the perceived novelty, which can enhance the satisfaction of the virtual tour. However, for properties in the local market, use of immersive or non-immersive VR will produce similar effects. The findings of this study are not just limited to the real estate industry. Nowadays, many companies use VR and may be at a loss when choosing the right type of VR technology to boost the performance of their strategic marketing campaigns. The findings of this paper can be applied to online retailing (e.g., retailers trying to attract international shopping tourists), hotel management, or destination marketing. Marketers can adjust their marketing tactics strategically according to the target market. Foreign retailers may use VR to promote their stores. For example, for attracting Chinese consumers planning an overseas visit to Paris, immersive VR may be a better marketing option. Such a tool may be used to entice Chinese consumers to visit a shopping mall, such as Galeries Lafayette, located overseas in Paris.

7.3. Limitations and Future Research

Despite the theoretical and managerial contributions of our study, it has limitations. We outline the limitations to suggest avenues for future research. First, we manipulated the type of VR (immersive vs. non-immersive) by showing stimuli through either a headset

(immersive) or a computer (non-immersive). These two types of VR differ in many ways, including their presence, interactivity, and vividness, we did not specifically examine which factor is playing the key role in influencing perceived novelty. Future research might conduct either additional experiments to determine the specific influential factors, or measure the perceived interactivity and vividness associated with the VR experience and include them as mediating variables. Second, in this study, due to the sampling method, the respondents are comparatively younger. Therefore, we did not measure users' purchase intention (PI) of the property. Future research may use a representative sample to examine if the results hold on users PI of the property. Third, due to dynamic interaction between the product and the consumer in a phygital setting, viewing property using immersive VR can result in emotional reactions. Our current inquiry is limited to studying the affective response triggered by the stimuli of VR. Future research could empirically investigate the specific emotions that perceived novelty can generate using a serial mediation model. Fourth, while we controlled certain individual difference variables based on OSL theory in our study, future research might investigate the moderating effects of individual difference variables such as sensation-seeking or regulatory focus on the current mediation model.

8. Conclusion

This study provides insights into the effect of interactive tools (i.e., immersive, and non-immersive VR) on consumer's phygital experience in real estate industry. The findings of this study confirm that compared to non-immersive VR, immersive VR increases perceived novelty, thereby enhancing user satisfaction. However, the effect of immersive VR on novelty is moderated by psychological distance. Our study reveals that showing a property via immersive VR is advantageous only when that property is perceived as more psychologically distant (vs. proximate)

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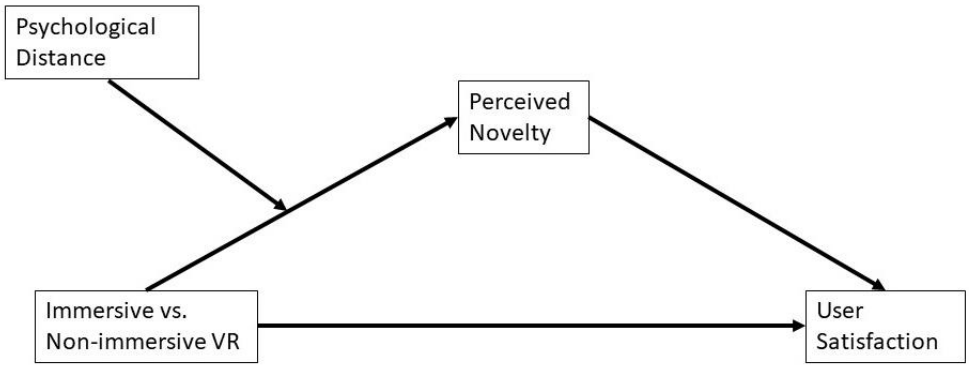

Figure 1. The overall model

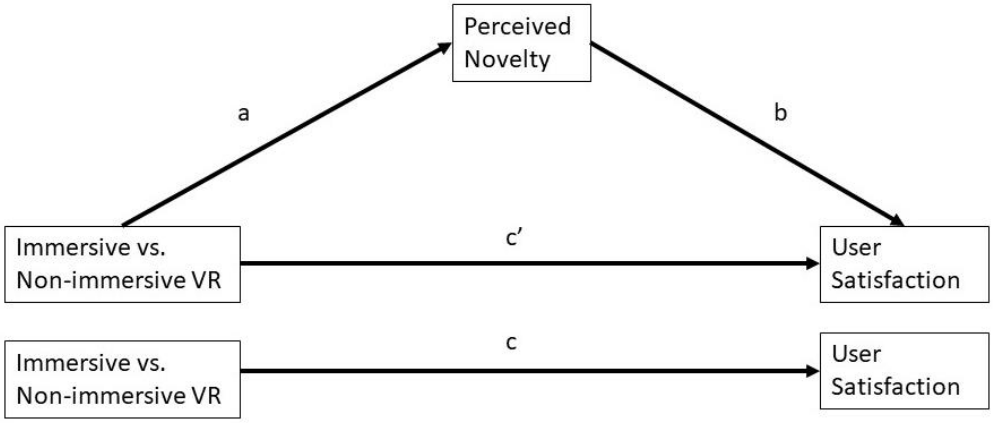

Figure 2. The statistical model

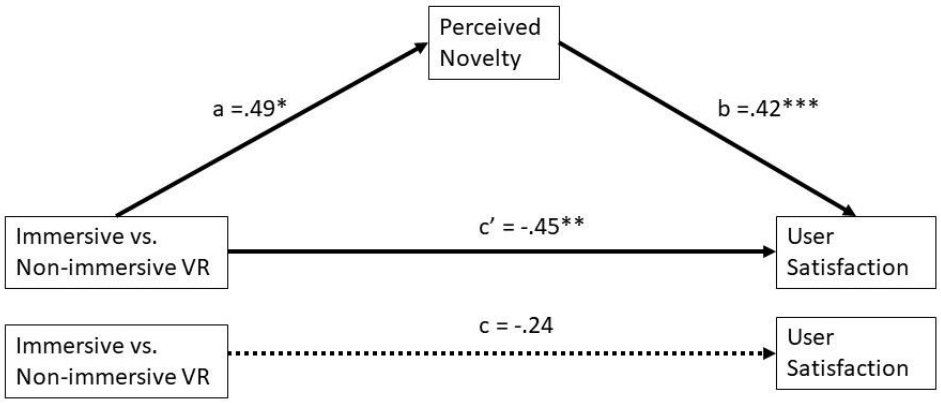

Figure 3. The overall serial mediation model

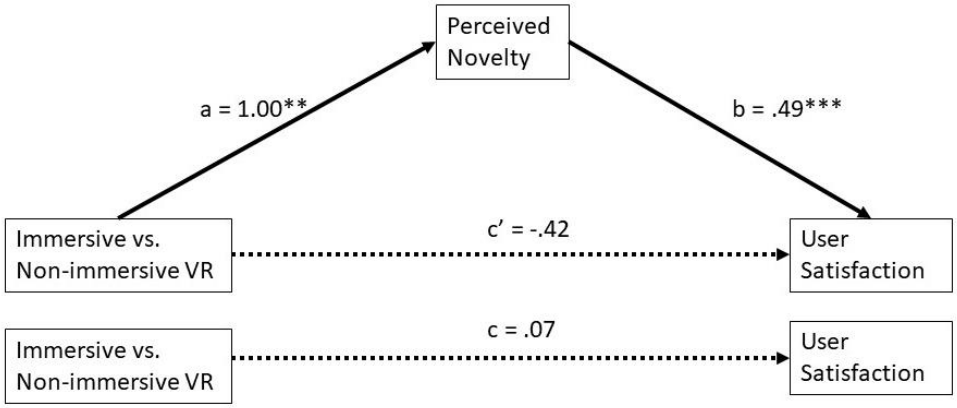

Figure 4. The serial mediation model for the psychologically distant condo

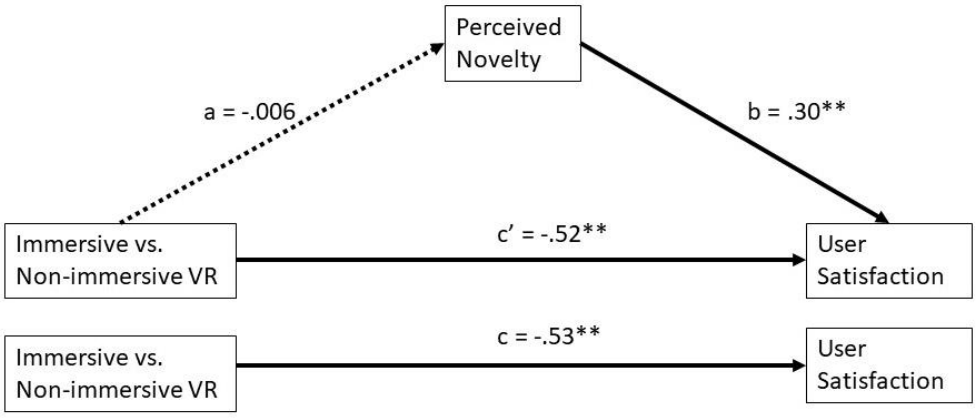

Figure 5. The serial mediation model for a psychologically proximate condo

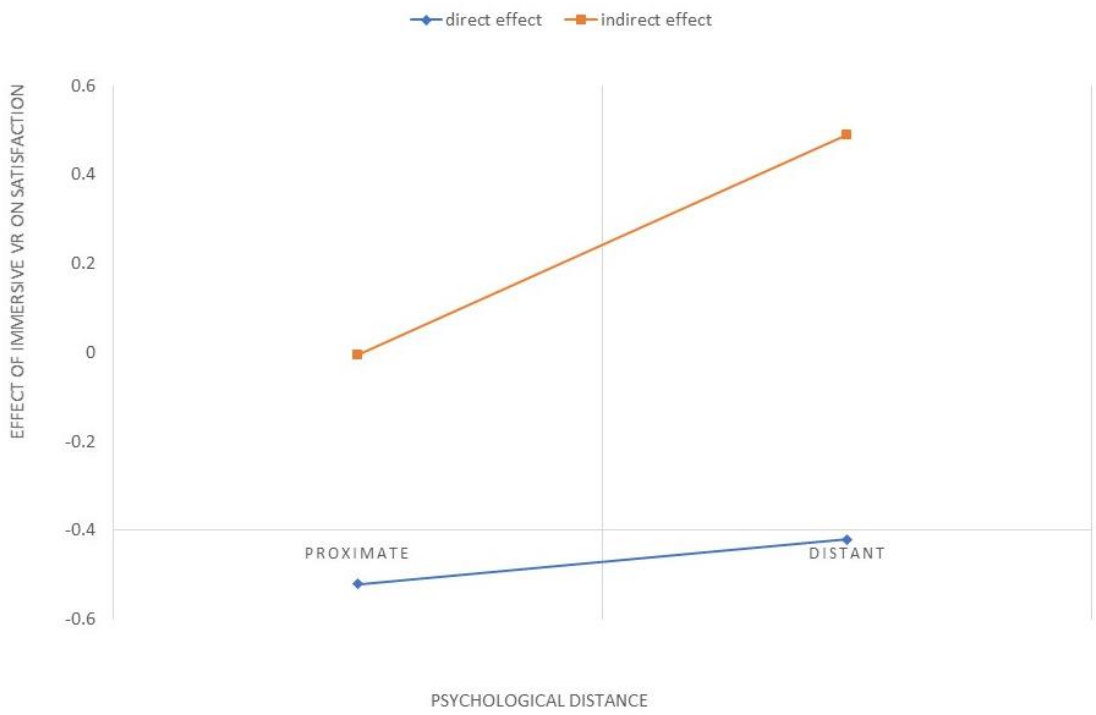

Figure 6. A visual representation of the conditional indirect and direct effects of immersive VR on user satisfaction

Note. Y-Axis should not be interpreted as user satisfaction. Y-Axis refers to the estimated difference in user satisfaction between immersive and non-immersive VR. Therefore, when the value is larger (smaller) than zero, immersive VR leads to higher (lower) satisfaction than non-immersive VR. A zero value means there is no difference between the two types of VR. The slopes of the lines show the extent of the effect of immersive VR depends on psychological distance.

Appendix:

Figure 1. The lab

Figure 2. One participant wearing VR headset

Figure 3. Stimulus (Loading)

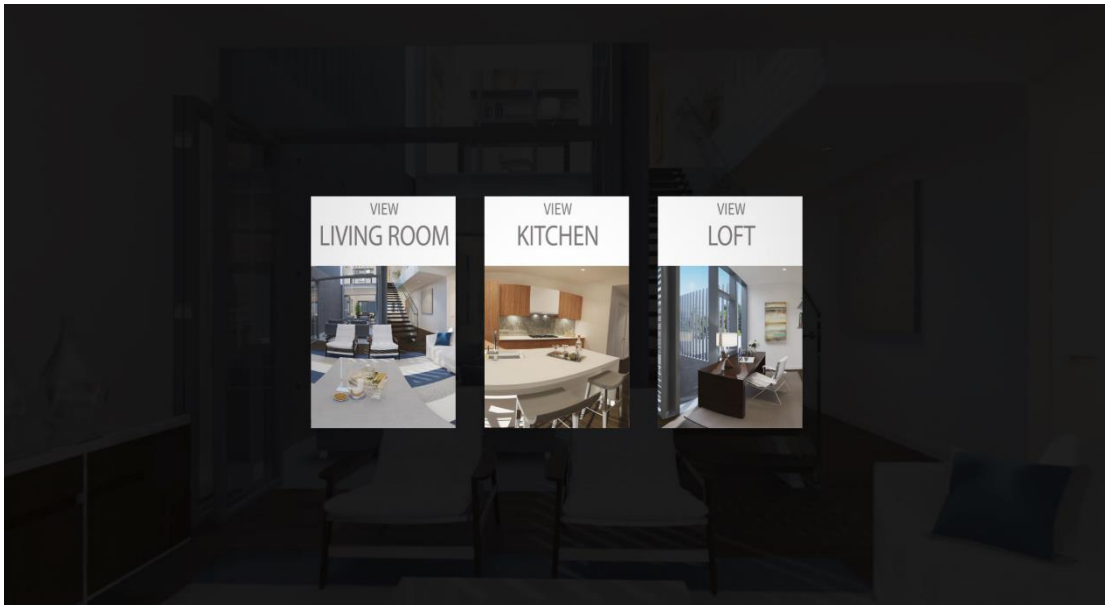

Figure 4. Stimulus (Selection of the room)

Figure 5. Stimulus (Loft)

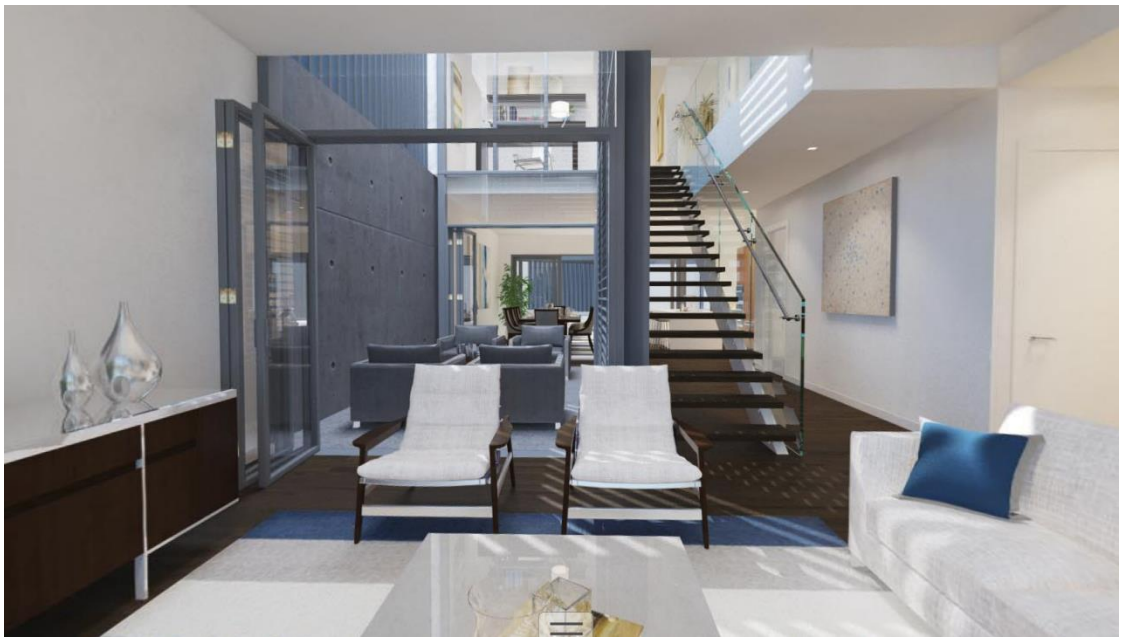

Figure 6. Stimulus (Living room)

Figure 7. Stimulus (Kitchen)