CAN VIRTUAL REALITY ENCOURAGE REPEAT VISITATION? THE MEDIATING ROLE OF NOSTALGIA

BY

HYUNSEO (VIOLET) YOON

DISSERTATION

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Doctoral Committee:

Professor Carla A. Santos, Chair
Assistant Professor Suiwen (Sharon) Zou, Chair
Assistant Professor Mikihiro Sato
Professor Patrick Vargas

ABSTRACT

The purpose of this research was to investigate the potential of virtual reality (VR) as a means of enhancing experiences and eliciting nostalgic thoughts of a previously visited destination and, in so doing, encouraging repeat visitation. Using the stimulus-organism-response (SOR) framework as a guiding theory, this research examined the effects of a sense of presence, facilitated by a VR stimulus focused on a previously visited destination, on tourists' personal nostalgia and revisit intention. The moderating roles of temporal distance and destination satisfaction on the relationship between the sense of presence and personal nostalgia were also investigated.

Based on the literature review, five hypotheses were proposed. To test the hypotheses, a mixed research method with an embedded design was adopted. A qualitative study (Phase 2) was embedded within a mixed-design laboratory VR experiment (Phase 1). In Phase 1, participants watched a 360-degree video about a visit to New York City (NYC) as a research stimulus. The experiment employed a 2 (between-subject: high vs. low sense of presence) by 2 (within-subjects: personal nostalgia and revisit intention before vs. after the research stimulus) design. In Phase 2, participants were asked to complete a survey consisting of a series of open-ended questions pertaining to their virtual NYC experience. The findings from Phase 2 were used to shed light on the findings from Phase 1.

Results from Phase 1 showed that there were no statistically significant effects of the sense of presence on personal nostalgia and revisit intention. And there were no statistically significant moderating effects of temporal distance and destination satisfaction on the relationship between the sense of presence and personal nostalgia. However, personal nostalgia

fully mediated the relationship between the sense of presence and revisit intention. Additional analyses revealed that personal nostalgia significantly increased after a VR destination experience, and temporal distance weakly moderated the relationship between a VR destination experience and personal nostalgia. Phase 2 supported most results from Phase 1.

As for theoretical implications, this research supported the SOR framework by conducting a mixed-design experiment and contributed to the expansion of the SOR framework by applying it to the virtual environment. In addition, the significant moderating effects of temporal distance called for more research adopting the SOR framework to include contextual factors. This research contributed to the knowledge expansion of the concept of nostalgia by examining its relationship with the sense of presence, revisit intention, temporal distance, and destination satisfaction. This research suggested several practical implications. First, marketing campaigns evoking personal nostalgia would be effective to attract past visitors. Second, such campaigns may not need a VR presentation mode providing a high sense of presence to be effective. Third, targeting past visitors whose last visit to the destination was relatively distant in time, compared to recent, may yield greater effectiveness and efficiency. Lastly, providing a quality destination experience could save marketing costs to attract past visitors. Several limitations and recommendations for future research were discussed.

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CHAPTER 1: INTRODUCTION

Justification for the Research

For destination marketers, retaining repeat visitors is a crucial goal because they offer several advantages compared to first-time visitors. For instance, repeat visitors reduce destination marketing costs (Haywood, 1989; Reichheld & Sasser, 1990). This is because repeat visitors are, compared to first-time visitors, more likely to continue to revisit (Chi, 2012; Oppermann, 2000; Petrick, 2004), less price-sensitive (Krischnamurthi & Papatla, 2003; Matzler et al., 2019), and more likely to spread positive word-of-mouth (Matzler et al., 2019; Petrick, 2004; Shoemaker & Lewis, 1999). Although it is not clear whether repeat visitors spend more money than first-time visitors (Alegre & Juaneda, 2006; Chang et al. 2013; Petrick, 2004; Shoemaker & Lewis, 1999), repeat visitation is known to be a key indicator of destination loyalty (Li et al., 2010). Securing repeat visitors seems especially imperative for some destinations. For instance, mature destinations are challenged to generate 'virgin demand' due to the high marketing costs of acquiring new tourists (Darnell & Johnson, 2001). Thus, mature destinations need to focus on more predictable, stable, and profitable markets (Qu et al., 2021; Reid & Reid, 1994). In addition, destinations whose selling points are specific attributes such as beach or ski resorts are heavily dependent on repeat visitors (Gitelson & Crompton, 1984; Tjørve et al., 2018). This is because certainty plays a more important role than novelty-seeking in those types of destinations (Tjørve et al., 2018).

Recognizing the importance of repeat visitation, the antecedents of revisit intention have been extensively researched for decades. Previous studies have shown that revisit intention is largely influenced by past destination experiences. Researchers have found that destination

satisfaction, memorability of destination experience, and perceived quality of the destination positively influence revisit intention (Assaker & Hallak, 2013; Jeong & Shin, 2020; Wu et al., 2018). That is, more positive and extraordinary past destination experiences lead to a higher revisit intention. Moreover, past studies on repeat visitors suggested that compared to first-time visitors, repeat visitors focus more on the affective attributes of a destination than cognitive attributes (e.g., Yolal et al., 2017). For example, Rather et al. (2022) found that compared to first-time visitors, repeat visitors are more motivated by hedonic strategies than cognitive strategies. This implies that the emotional aspects of past destination experiences play a role in revisit intention. Nevertheless, it is relatively unknown how to utilize such tendency to induce repeat visitation. To fill the research gap, this research, as a starting point, proposed to develop a model for destination loyalty management.

This research proposed that evoking personal nostalgia of one's past destination experience can increase revisit intention. Nostalgia is defined as a mental state of longing for the past (Reisenwitz et al., 2004). When individuals have nostalgic feelings about their first-hand, lived experiences, it is called personal nostalgia (Stern, 1992). Unlike other similar concepts such as autobiographical memory, nostalgia is both cognitive and emotional (Cho et al., 2015; Wilson, 2005), and thus, personal nostalgia can be a more powerful predictor of revisit intention. Moreover, extant research suggested that personal nostalgia is a motivational construct. When individuals feel nostalgic about a past experience, they desire to relieve the experience (Holbrook, 1993) because personal nostalgia is often associated with positive emotions regarding a pleasant experience (Muehling & Pascal, 2011). Therefore, personal nostalgia about a past visit to a destination could lead to intentions to revisit the destination. To be sure, several recent

studies demonstrated a positive relationship between personal nostalgia and revisit intention (e.g., Hu & Xu, 2021; Jian et al., 2021).

Given the abovementioned, nostalgia can be a useful tool for destination marketing particularly directed at encouraging repeat visitation. However, research suggested that nostalgia has not been actively engaged and adopted in destination marketing. For instance, Christou et al. (2018) revealed that destination stakeholders understand the benefits of nostalgia in destination marketing but do not strategically utilize it. This could be because strategies to evoke nostalgia have not been extensively researched in tourism. It has been shown that nostalgia can be evoked by various triggers such as people and sensory inputs (Sedikides et al., 2008; Wildschut et al., 2006). This suggests that managing nostalgic feelings may be possible by utilizing nostalgia-inducing stimuli (i.e., nostalgia triggers). Nevertheless, nostalgia triggers are often overlooked in nostalgia studies. It is especially imperative to investigate triggers evoking personal nostalgia. Carlsen and Charters (2007) argued that revisit intention fades away due to exposure to other destinations' marketing campaigns. Li et al. (2021) conducted a longitudinal study and found that revisit intention decreased over time due to faded sensory impressions about the destination. These studies underscored the importance of implementing post-visit management strategies for past visitors in order to cultivate destination loyalty. This research, therefore, investigated the relationship between nostalgia triggers, personal nostalgia, and revisit intention.

This research examined a sense of presence as a personal nostalgia trigger. A sense of presence refers to a psychological state of feeling present in a mediated environment (Steuer, 1992). Researchers have studied a sense of presence using virtual reality (VR) technology. VR is described as a computer-generated three-dimensional environment where users can navigate and interact with a real-time simulation (Guttentag, 2010). By simulating the physical environment,

VR provides a higher sense of presence than other types of media such as 2-dimensional images (see Skard et al., 2021). According to Kvavilashvilli and Mandler (2004), a past event is better retrieved when individuals are in a situation that closely resembles the past event. This means that a high sense of presence from a VR destination experience could effectively evoke personal nostalgia as a nostalgia trigger. Several studies empirically showed that a VR destination experience positively influences personal nostalgia (e.g., Lin et al., 2020; Shin & Jeong, 2022). However, the specific aspect of a VR destination experience that elicits personal nostalgia remains unclear. This research accordingly examined the effects of a sense of presence, induced by a VR destination experience, on personal nostalgia and revisit intention.

Many researchers have found that a sense of presence from a VR destination experience increased visit intention (e.g., Tussyadiah et al., 2018; Ying et al., 2021). However, it remains uncertain whether this applies to past visitors (i.e., individuals having past visit experience(s)). According to Skard et al. (2021), VR has a stronger positive effect on visit intention for visitors with limited past visit experiences, compared to 2-dimensional images. Conversely, for visitors with a high level of past visit experiences, VR is found to have a less positive impact on visit intention. Their results suggest that a past destination experience could influence the effects of the sense of presence on behavioral intentions. Destination marketers may need to use separate marketing tools for past visitors and potential visitors (i.e., individuals having no past visit experience) if a high sense of presence is not effective for destination loyalty management. Therefore, it is imperative to investigate the effects of the sense of presence on revisit intention.

Conceptual Framework

This research examined the effects of a sense of presence, induced by a VR destination experience, on revisit intention, with personal nostalgia serving as a mediator. This research was grounded in the stimulus-organism-response (SOR) framework. The SOR framework addresses the mechanism of how individuals process and react to external stimuli (Mehrabian & Russel, 1974). Mehrabian and Russell (1974) argued that when individuals are exposed to an external stimulus, a response is triggered through internal processes (organism). The SOR framework was originally developed to explain human responses to the physical environment. Several researchers extended this framework to various contexts including virtual environments (e.g., Kim et al., 2020). Therefore, it was deemed appropriate to examine a sense of presence, induced by a VR destination experience as a stimulus.

The focus of the SOR framework is on the internal processes of an external stimulus (Jacoby, 2002). It is believed that individuals process a stimulus through both cognitive and affective systems (Bitner, 1992). Nostalgia is regarded as a construct in which both cognitive and affective systems are involved (Holbrook, 1993). Hence, personal nostalgia was deemed appropriate to examine as an organism. A response is expressed in either a positive or negative way (Mehrabian & Russel, 1974). Several tourism researchers have adopted the SOR framework to examine the effect of a marketing strategy on behavioral intentions (e.g., Chang, 2016; Manthiou et al., 2017; Shin & Jeong, 2022). With this in mind, revisit intention was investigated as a response. Although the SOR framework is based on causal relationships, many studies adopting the SOR framework primarily focused on correlations. This research thus supported the SOR framework by examining causal relationships between the proposed variables.

This research proposed two moderators between the sense of presence and personal nostalgia. The first moderator is a temporal distance to a past visit. A temporal distance refers to the distance from now to a target event (Bar-Anan et al., 2006). Building on theories of forgetting, this research hypothesized that the positive relationship between the sense of presence and personal nostalgia will be enhanced when there is a greater temporal distance to a past visit. Forgetting theories such as the trace decay theory and the interference theory posit that human memories fade away over time (Baddeley, 1998; Thorndike, 1913). This means that old memories are harder to retrieve than new memories. The retrieval failure theory suggests that retrieval failure occurs when retrieval cues are limited (Tulving, 1974). Retrieval cues are described as situational information stored together with memories. Thus, when individuals have difficulty retrieving memories, retrieval cues can assist it. That said, older memories need more assistance from retrieval cues to retrieve. This research proposed that a sense of presence increases personal nostalgia because a higher sense of presence can better facilitate the retrieval of memories. Thus, retrieval cues serve as nostalgia triggers. Consistent with this idea, nostalgia about a recent event may be less susceptible to the influence of a sense of presence since the event is still vivid in one's memory. In contrast, nostalgia about a distant event is more receptive to the influence of a sense of presence as it requires additional retrieval cues to retrieve the memory. Therefore, temporal distance to a past visit may moderate the relationship between the sense of presence and personal nostalgia.

The second moderator is destination satisfaction. Destination satisfaction is defined as a cognitive-affective state derived from a destination experience (del Bosque & San Martin, 2008). As a final stage of tourist decision-making (Um et al., 2006), destination satisfaction indicates how individuals evaluate a destination experience. Personal nostalgia usually occurs when a past

event is perceived positively. Thus, the level of personal nostalgia about a past visit to a destination would depend on an evaluation of a past visit experience. For instance, when individuals evaluate a past visit negatively, the level of personal nostalgia will be lower, compared to when they evaluate the past visit positively. This research proposed that memories are better evoked when in a situation that resembles a past event (Kvavilashvilli & Mandler, 2004). This suggests that when a past visit is evaluated negatively, the negative experience will be better evoked by a higher sense of presence. Conversely, when a past visit is evaluated positively, a high sense of presence will better evoke a positive experience. Hence, this research suggested that destination satisfaction moderates the relationship between a sense of presence and personal nostalgia.

Objectives and Hypotheses

This research aimed to investigate the effects of a sense of presence, facilitated by a VR experience of a previously visited destination, on revisit intention and the mediating role of personal nostalgia between the sense of presence and revisit intention. Based on the above, four research questions were developed:

1) What are the effects of a sense of presence, elicited by a VR experience of a previously visited destination, on personal nostalgia and revisit intention?
2) What is the role of personal nostalgia in the relationship between the sense of presence and revisit intention?
3) What is the role of temporal distance to a past visit in personal nostalgia evocation?
4) What is the role of destination satisfaction in personal nostalgia evocation?

Based on the research questions, five hypotheses were developed as below. **Figure 1.1** visualizes the proposed conceptual framework of the research.

H1: A high (vs. low) sense of presence, facilitated by a VR experience of a previously visited destination, will increase personal nostalgia.

H2: A high (vs. low) sense of presence, facilitated by a VR experience of a previously visited destination, will increase revisit intention.

H3: Personal nostalgia will mediate the relationship between sense of presence and revisit intention.

H4: Temporal distance will moderate the relationship between sense of presence and personal nostalgia. As temporal distance to the most recent visit increases, the positive relationship between sense of presence and personal nostalgia will be stronger.

H5: Destination satisfaction will moderate the relationship between sense of presence and personal nostalgia. As the level of destination satisfaction increases, the positive relationship between sense of presence and personal nostalgia will be stronger.

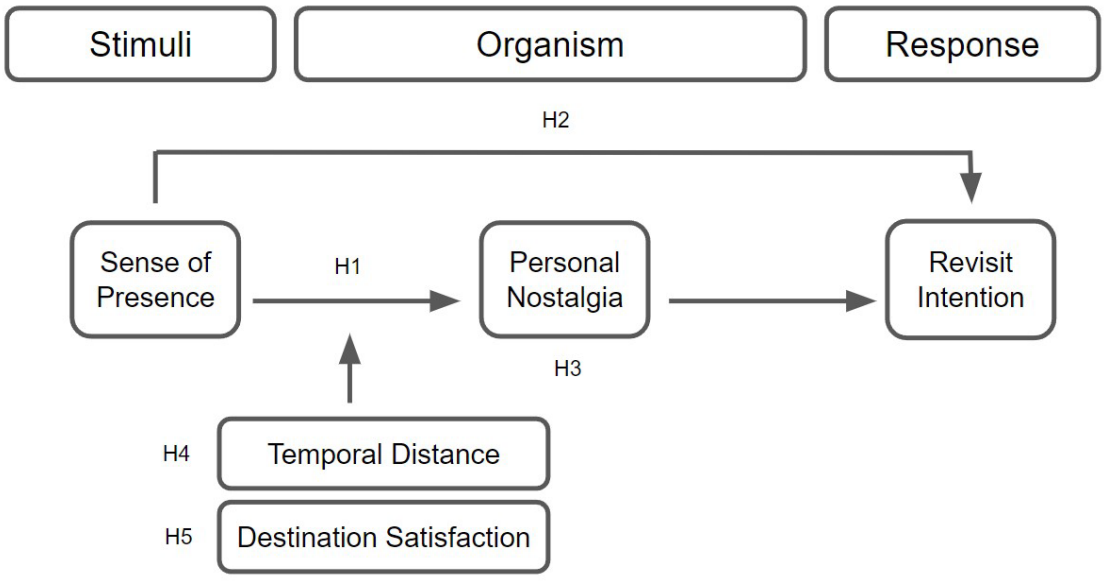

Figure 1.1 Proposed conceptual framework of the research.

Definition of Key Terms

Destination satisfaction – A cognitive-affective state derived from a destination experience (del Bosque & San Martin, 2008).

Organism – "Individuals' affective and cognitive intermediary state that occur when they interact with stimuli" (Tang et al., 2019, p. 218).

Personal nostalgia – Yearning for one's personal past experiences (Stern, 1992).

Presence – The mental state of feeling physically presented in the mediated environment (Steuer, 1992).

Response – Behaviors towards stimuli (Manthiou et al., 2017).

Revisit intention – The subjective probability that an individual will revisit a destination (Fishbein & Ajzen, 1975).

Stimuli – External influences consist of various elements of physical atmosphere (Bagozzi, 1986).

Temporal distance – The distance from now to the target event (Bar-Anan et al., 2006).

CHAPTER 2: LITERATURE REVIEW

This chapter reviews the literature on the key variables adopted in this research. This includes sense of presence, personal nostalgia, and revisit intention. The purpose of this chapter is to outline the choice of key variables and their conceptual alignment.

Presence

Presence is defined as the psychological state of feeling physically presented in a mediated environment (Schubert et al., 2001; Slater & Steed, 2000; Steuer, 1992). When individuals feel a sense of presence, the virtuality of the mediated environment is unnoticed as they psychologically perceive virtual and physical environments similarly (Lee, 2004). Several researchers tried to explain the psychological mechanism of a sense of presence. Lombard and Ditton (1997) argued that presence is the outcome of an illusion in which individuals perceive mediation as non-mediation. That is, cognitive and affective responses to sensory inputs from the mediated environment create a psychological illusion. The estimation theory put forward by Sheridan (1999) supports this notion. Sheridan argued that humans can never understand the true reality, thus estimating it by continuously updating a mental model of reality. When individuals experience a mediated environment, they create a mental model of the mediated environment by processing the sensory inputs (Sheridan, 1999). During this process, individuals attempt to find a matching model of the physical environment by suppressing information that mismatches between the mediated environment and the physical environment (Sheridan, 1999). When individuals find a matching model of the physical environment, a sense of presence occurs. Seth et al. (2012) proposed a similar notion. Seth et al. argued that a sense of presence is a result of

suppression of the mismatch between the actual interoceptive state and the predicted state. The actual interoceptive state refers to the actual responses to the environment. The predicted state indicates the predicted responses to the environment based on previous experiences. Overall, scholars suggested that the role of the human mind is crucial in a sense of presence. As Biocca et al. (2001) stated, a sense of presence is an outcome of collaboration among a mediated environment, a physical environment, and mental imagery.

Measuring sense of presence

Scholars have different approaches to sense of presence measurements. For example, a sense of presence could be measured based on the conceptual types of presence. Heeter (1992) suggested three types of presence: personal, social, and environmental. Personal presence refers to a sense of self being in a mediated environment. Social presence is about a sense of others being in a mediated environment. Environmental presence indicates a sense of a mediated environment itself where one reacts to. Thus, a sense of presence could be measured according to those three dimensions. Similarly, Lee (2004) proposed three types of presence: self presence, social presence, and physical presence. Lee's classification shares similarities with the three dimensions of presence suggested by Heeter. However, the difference is that Lee's classification compared virtuality and reality, while Heeter's classification focused on perceived existence. For instance, Lee defined self-presence as the extent to which individuals perceive virtual selves as actual selves, while Heeter conceptualized personal presence as the extent to which individuals perceive themselves as being in a mediated environment.

Meanwhile, several scholars tried to measure a sense of presence focusing on its operation. Slater et al. (1993; 1994) used a navigation metaphor to describe the operation of a

sense of presence. They argued that a sense of presence occurs when individuals perceive a mediated environment as a place rather than a set of images. Thus, the mental state of the post media experience is important (Slater, 1999). Based on this notion, Slater (1999) adapted the Slater, Usoh, and Steed (SUS) Questionnaire. The SUS Questionnaire embraces the navigation metaphor of a sense of presence: a sense of being in an environment depicted by the mediated environment, the extent to which the mediated environment becomes the dominant one, and the extent to which one remembers the mediated environment as having visited a place after the experience. On the other hand, Kim and Biocca (1997) measured a sense of presence according to arrival and departure dimensions based on the transportation theory suggested by Gerrig (1993). The transportation theory postulates that a media experience is similar to a journey involving departure and arrival. Individuals are transported from their place to a mediated environment when the media experience begins and then return to their place when the experience ends. In this vein, Kim and Biocca argued that a sense of presence involves a detachment from the surrounding physical environment (i.e., departure) and a sense of being in the mediated environment (i.e., arrival).

Kim and Biocca's (1997) notion implies that individuals could feel different levels of the sense of presence in the same mediated environment depending on the mediating tool. Specifically, a mediating tool that can effectively detach users from the physical environment could provide a higher sense of presence. For example, a VR experience is thought of as providing a stronger sense of presence than other types of mediating tools. VR technology is defined as "the use of computer-generated 3D environment[s], that the user can navigate and interact with, resulting in real-time simulation of one or more of the user's five senses" (Guttentag, 2010, p. 638). VR is usually performed with a head-mounted device (HMD). This

device effectively blocks stimuli from the surrounding environment, thus facilitating a high sense of presence. Gutierrez et al. (2008) argued that physical immersion and psychological presence characterize a VR experience. Physical immersion refers to the degree of interactions that users can have with the physical environment during a VR experience. Psychological presence refers to users' feeling that they are physically in the virtual world. Their view on a VR experience is in line with Kim and Biocca's notion of the sense of presence. Specifically, physical immersion and psychological presence correspond to departure and arrival, respectively. This may suggest that a VR experience depends on a sense of presence in which a mediating tool plays a crucial role. Indeed, Ying et al. (2021) have found that different VR presentation modes generated different levels of the sense of presence. This research aimed to examine the effects of a sense of presence on personal nostalgia and revisit intention by manipulating the VR presentation mode. Thus, this research adopted Kim and Biocca's notion of the sense of presence.

Sense of presence in tourism research

To date, tourism scholars have mostly focused on VR technology as a means to study the sense of presence. The discussions among tourism scholars on VR can be dated back to the 1990s. Early works identified and positioned VR as a useful marketing, managerial, and alternative tool given its immersive qualities (e.g., Cheong, 1995; Williams & Hobson, 1995). Particularly, the advertising and promotion effects of VR were highlighted due to its simulation abilities that facilitate a sense of presence. Prior to VR, tourism was viewed as a product that cannot be pre-tested. VR can serve as a medium that enables pre-testing of a destination by facilitating a high sense of presence and it can lead to a more positive attitude toward the destination and increased visitation. Subsequent empirical studies have demonstrated the

advertising and promotion effects of a sense of presence facilitated by a VR destination experience. For example, Bogicevic et al. (2019) found that a high sense of presence from a VR destination experience induced a higher destination brand experience. Others examined the effect of a sense of presence from a VR destination experience on behavioral intentions. Alyahya and McLean (2021) showed that a higher sense of presence from a VR destination experience generated a more positive attitude toward the destination and thus increased visit intention. Tussyadiah et al. (2018) revealed a positive relationship between VR presence and visit intention through attitude change. Meanwhile, Ying et al. (2021) delved into the psychological mechanism of the effects of the sense of presence on behavioral intentions. They showed that a sense of presence from a VR destination experience influenced visit intention through both the cognitive (i.e., education) and affective (i.e., entertainment and esthetics) systems. To sum up, tourism research about the sense of presence has mostly focused on the effects of a VR destination experience on visitors' attitudes and behavioral intentions.

The aforementioned literature review suggests that a sense of presence from a VR destination experience has an effect on promoting attitudes and behavioral intentions among visitors. However, the current understanding of such effects is still fragmented as past studies mostly treated new visitors and past visitors homogeneously. In particular, past visitors could process information about a destination differently from new visitors because past visitors have organic information (i.e., information from first-hand, lived experiences) about the destination. To be sure, an organic source is the most powerful information agent (Gartner, 1994). Indeed, Skard et al.'s (2021) research suggested that the effects of the sense of presence on behavioral intentions can differ between new visitors and past visitors. Specifically, they found that VR, compared to 2-dimensional images, had a more positive influence on visit intention for visitors

with a low level of past visit experiences. Conversely, for visitors with a high level of past visit experiences, VR had a less positive influence on visit intention than 2-dimensional images. Although Skard et al. did not compare the effects of the sense of presence between past visitors and new visitors, their study implies that a past destination experience could influence the effects of the sense of presence on behavioral intentions. Specifically, a high sense of presence may not be necessary for destination loyalty management according to their study. Therefore, more research on the advertising and promotion effects of the sense of presence is needed considering various visitor groups.

Nostalgia

Nostalgia refers to the mental state of longing for the past (Davis, 1979; Holbrook, 1993; Reisenwitz et al., 2004). The term 'nostalgia' was coined by Swiss physician Johannes Hofer in 1688 to refer to a psychopathological condition of suffering from longing for the past (Chark, 2021). The word 'nostalgia' originated from the Greek word nostos and algos (Chark, 2021). Nostos refers to return, and algos means suffering (Chark, 2021). People feel melancholy about something that has disappeared forever (Bazin, 2013). Due to this reason, nostalgia was regarded as a mental illness (Beck, 2013; McCann, 1941). The medical term 'nostalgia' started being used as an academic concept following Davis (1979) (Wildschut et al., 2018).

In psychology, nostalgia is a complex construct as it involves both cognitive and affective processes (Chark, 2021). Since nostalgia involves reflecting on the past, it requires cognitive processes such as recalling, thinking, and imagining past experiences (Stern, 1992), leading to affective responses. In this regard, nostalgia differs from other concepts that involve remembrances such as recollection, autobiographical memory, and reminiscence (Cho et al.,

2015; Wilson, 2005). Nostalgia involves both emotional valences (i.e., positive and negative). Because it is impossible to retrieve the past, nostalgia brings sadness from a sense of loss (Jarratte & Gammon, 2016). At the same time, positive memories evoke positive emotions such as warmth and comfort (Jarratte & Gammon, 2016). Thus, some scholars described nostalgic feelings as bittersweet (e.g., Davis, 1979; Holbrook & Schindler, 1991). Recent studies suggested that a dominant emotional valence of nostalgia may depend on the context. Newman et al. (2020) found that nostalgia involved mostly positive emotions when generated by memories, and it involved mostly negative emotions in everyday life experiences. This suggests that a nostalgic feeling of a past destination experience would be mostly positive.

Nostalgia triggers

Nostalgic feelings are evoked by triggers because nostalgia is related to human memories. There are three main types of nostalgia triggers: social aspects, sensory inputs, and events (Havlena & Holak, 1991; Holbrook, 1993; Sedikides et al., 2008). In terms of social aspects triggers, it is believed that the one people have met in the past can evoke nostalgic thoughts (Sedikides et al., 2008). Particularly, when individuals hold a favorable impression of someone they know, their memories about that person tend to be vivid and long-lasting (Holak & Havlena, 1998). Sensory inputs refer to external stimuli that engage human senses such as food, music, scents, or environmental cues (Muehling & Sprott, 2004; Wildschut et al., 2006). When individuals receive sensory stimuli associated with the past, it can evoke nostalgic feelings. Sedikides et al. (2004) argued that sensory inputs are remembered for long periods as they stimulate human memory cells. Events can also trigger nostalgia (Merchant et al., 2011). People tend to easily forget ordinary events compared to infrequently held events according to the

scarcity principle (Hwang & Hyun, 2013). Hence, memorable events such as anniversaries or holidays are effective to evoke nostalgia.

Types of nostalgia

Early scholars divided nostalgia into negative and positive nostalgia depending on whether a nostalgic feeling is about one's first-hand experience or not. They proposed that if a nostalgic feeling is not related to one's own experience, it is a mental disorder. For example, Rumke (1940) argued that nostalgia irrelevant to one's past experience is fake. Rumke suggested two types of nostalgia: pseudo-nostalgia and true nostalgia. Pseudo-nostalgia refers to nostalgia that is not related to one's personal experience. True nostalgia is evoked by surrounding environments related to one's past experience. In a similar vein, Martin (1954) classified nostalgia into pathological nostalgia and healthy nostalgia. Pathological nostalgia is not related to personal experiences, thus a pathological disorder, while nostalgic feelings about personal experiences are considered normal and healthy.

Recent scholars attempted to free nostalgia from values by classifying it based on associated memories. For example, Stern (1992) divided nostalgia into historical nostalgia and personal nostalgia. Historical nostalgia is also called vicarious nostalgia (Marchegiani & Phau, 2013) or collective nostalgia (Shin & Parker, 2017). Historical nostalgia is described as yearning for a past that individuals may have not experienced but perceive as better than the present (Christou et al., 2018). This notion shares some commonalities with pathological nostalgia and pseudo-nostalgia in that it is not about one's own experience. However, it is not regarded as an illness because individuals can feel nostalgia toward collective memories that are learned from or shared by others such as history or culture (Halbwachs, 1950; Shin & Parker, 2017). Thus,

according to this view, individuals can feel nostalgia about the past, even if they do not have first-hand experiences.

Personal nostalgia is also called private nostalgia (Shin & Parker, 2017). It is in line with the notion of healthy nostalgia and true nostalgia in terms of yearning for one's own experiences. The mechanism of personal nostalgia evocation is supported by the autobiographical memory theory suggested by Neisser (1988). According to the autobiographical memory theory, one's past experiences can be evoked by triggers related to their past experiences. Personal experiences could be episodic memories (Tulving, 1984) or self-referencing thoughts (Marchegiani & Phau, 2013). After all, personal nostalgia and historical nostalgia are all associated with memories that are evoked by triggers, but they involve different cognitive processes (Marchegiani & Phau, 2013).

Nostalgia in tourism research

Nostalgia originated from homesickness (Christou et al., 2018). It is a feeling of longing for one's home, with the desire to return to it. This means that nostalgic feelings about a place motivate people to visit the place. In this vein, Dann (1977) discussed nostalgia as one of the key tourism motivations. The tourism literature has shown that individuals feeling nostalgic about a destination desire to visit the destination. For example, several researchers have paid close attention to historical nostalgia as a motivation for heritage tourism (e.g., Caton & Santos, 2007; Suntikul, 2017), because heritage sites provide tangible evidence to fulfill the nostalgic imagination of the past (Urry, 1990). Nostalgia has also been studied through film tourism. Kim and Kim (2018) posited that films have the potential to evoke nostalgic feelings when they tell stories similar to one's past life experiences or culture. Hence, personal and/or historical

nostalgia evoked by a film leads to a desire to visit places that are depicted in the film (Kim et al., 2019). Nostalgia has also been extensively discussed in the context of sport tourism. Among various types of sport tourism, visiting meaningful places for a sports team such as halls of fame, stadiums, or sports museums is regarded as nostalgia-led (Gibson, 1998). In addition, some researchers focused on personal nostalgia as a motivation for repeat visitation. Individuals who long for a past destination experience can desire to revisit the destination (Chen & Xiao, 2013; Plog, 2001). To be sure, the relationship between personal nostalgia and revisit intention has been empirically investigated (e.g., Hu & Xu, 2021; Jian et al., 2021). Overall, the extant literature has suggested that nostalgia is a key tourist motivation.

Despite the extensive research on nostalgia, there is still a limited understanding of its broader role in tourism. This is mainly due to the challenge of capturing and effectively utilizing nostalgia in the tourism industry. Past studies discussed above suggested that nostalgia is an essential tourist motivational construct. This implies that nostalgia can be utilized in destination marketing. However, existing tourism studies on nostalgia have provided limited guidance on how to effectively evoke nostalgia. Since a nostalgic feeling is evoked by triggers, marketing studies on nostalgia should focus on the role of nostalgia triggers. More specifically, it is important to understand which types of triggers are effective in evoking nostalgic feelings and to determine when and how to use them in order to inform the effective use of nostalgia in marketing. Christou et al. (2018) argued that destination managers understand the usefulness of nostalgia in destination marketing, but do not strategically utilize it. Therefore, this research investigated the role of nostalgia in destination marketing with nostalgia triggers.

Measuring personal nostalgia

This research aimed to investigate ways to encourage repeat visitation. Extant literature showed that personal nostalgia is a motivation for repeat visitation to a destination. Thus, this research focused on personal nostalgia. Personal nostalgia can be measured in various ways. Some researchers used measurements that include the influence of nostalgia triggers. For example, in Shin and Jeong's (2022) study about the effects of a virtual trip experience on visit intentions, personal nostalgia was measured with items such as 'The virtual trip evoked positive memories about my last trip to the destination.' Jian et al. (2021) studied the relationship among travel constraints, personal nostalgia, and revisit intention. They used items such as 'This place makes me think of myself a long time ago.' Meanwhile, other studies asked participants to recall a past tourism event without using a specific trigger. For instance, Hu and Xu (2021) examined the relationship among memorability of a past travel experience, personal nostalgia, and revisit intention. They used items such as 'Thinking about this experience makes me feel nostalgia.'

Extant research has also measured state nostalgia, which evaluates a heightened state of nostalgic feelings. This does not embrace the influence of triggers. For example, Chark (2021) studied the relationship among psychological need, nostalgia, and revisit intention. Chark measured state nostalgia using items such as 'Right now, I am having nostalgic feelings.' This measurement is useful to examine causal relationships as it does not infer any relationships with other constructs. Stephan et al. (2012) adapted state nostalgia measurement in their experimental study about construal differences among nostalgic, ordinary, and positive autobiographical events. They checked the manipulation of nostalgia between a nostalgic event condition and an ordinary event condition using state nostalgia measurement. This research employed an

experimental design to examine the effects of nostalgia triggers on personal nostalgia and revisit intention. Therefore, state nostalgia measurement was adapted in this research.

Revisit Intention

Revisit intention is a key indicator of destination loyalty (Li et al., 2010). Loyalty is often described in consumer research as a commitment to a product (Baker & Crompton, 2000; Moore et al., 2017; Rivera & Croes, 2010). Loyal customers are known to decrease marketing costs and provide sustainable profits (Almeida-Santana & Moreno-Gil, 2018). Hence, there have been numerous attempts to measure loyalty. According to Jacoby and Chestnut's (1978) review of the extant work on loyalty, there are three ways to measure loyalty: behavioral, attitudinal, and composite. Behavioral measures are based on consumer actual behaviors such as purchase behaviors. Jacoby and Chestnut further broke down behavioral measures into a sequence of purchases, a proportion of purchases, and a probability of purchases. A sequence of purchases examines a sequential pattern of six consecutive purchases. Depending on the pattern, a sequence of purchase is subdivided into undivided loyalty, divided loyalty, unstable loyalty, and irregular sequences (Jacoby & Chestnut, 1978). The proportion of purchases is about the ratio of a purchase of a specific brand in comparison to all purchases. Different cut-off points of the ratio can be used to determine loyalty. The probability of purchases statistically predicts consumption behaviors based on previous purchase behaviors.

Nevertheless, behavioral measures are not capable of distinguishing between intentional loyalty and spurious loyalty (Day, 1969). The difference between the two types of loyalty depends on whether it is the brand or the situation that drives future purchases. For example, with spurious loyalty, consumers keep purchasing a product not because of a commitment to the

brand but because of utility benefits such as monetary rewards or convenience. Attitudinal measures can account for the variance that behavioral measures cannot explain (Backman & Crompton, 1991) as they can gauge a psychological commitment to a brand. These include brand preference (Guest, 1942), cognitive loyalty (Jarvis & Wilcox, 1976), the distance between acceptance and rejection (Jacoby, 1971), and purchase intention (Juster, 1966). Another criticism regarding behavioral measures is that they lack theoretical support and capture only static outcomes of dynamic decision-making processes (Dick & Basu, 1994). Attitudinal measures address this issue by being grounded in psychology theories such as the theory of reasoned action and the theory of planned behavior. These theories postulate that behavioral intentions are predictors of actual behaviors (Ajzen & Fishbein, 1977) and elucidate the psychological processes underlying decision-making.

Composite measures are a mixture of behavioral measures and attitudinal measures. Day (1969) argued that true loyalty can be measured by using both behavioral and attitudinal approaches. Day measured loyalty with the ratio of purchases of a brand's products to the consumers' attitude towards the brand. However, composite measures had several issues. First, it is not clear where and how much weight should be given to purchases and attitude. Second, Day's loyalty index measures attitude only once at the beginning of the study, but measures purchase multiple times over time. This can be misleading and lead to inaccurate results. Lastly, the combination of behavioral measures and attitudinal measures tends to make surveys lengthy (Oppermann, 2000).

Due to the aforementioned advantages, attitudinal measures are widely used in loyalty research. Although attitudinal measures are often criticized for not being sufficient to predict actual behaviors (see McKercher & Tse, 2012), they are deemed appropriate especially in the

tourism context because there are uncontrollable factors influencing actual behaviors such as travel constraints. Consuming tourism products require more time, money, and energy compared to other experiential products. These constraints delay or hinder actual purchases, even though tourists have a high commitment to a brand. Hence, it could be more effective to adopt attitudinal approaches to examine loyalty in the tourism context. Moreover, contrary to the criticism toward attitudinal measures, many studies are revealing that behavioral intentions are significant predictors of actual behaviors (e.g., Hsu & Huang, 2012; Sheppard et al., 1988; van den Putte, 1991). Accordingly, attitudinal measures have been dominantly used in destination loyalty studies (Meleddu et al., 2015). This research, therefore, adopted attitudinal measures. Specifically, this research focused on revisit intention among various attitudinal measures including recommendation intentions and attitude towards a destination. As discussed above, several scholars argued that repeat purchases are the key indicator of loyalty. Many tourism studies adopted revisit intention to examine destination loyalty (e.g., Hu & Xu, 2021; Jian et al., 2021).

Antecedents of revisit intention

Recognizing the importance of understanding revisit intention in destination loyalty management, the antecedents of revisit intention have been extensively researched. Extant studies on revisit intention seem to agree that past visit experiences influence revisit intention. In consumer research, it is widely believed that satisfied customers would buy more (Chi & Qu, 2008). Similarly, in the tourism context, past studies empirically found that destination satisfaction is positively associated with revisit intention (e.g., Assaker & Hallak, 2013; Choo & Petrick, 2014; Um et al., 2006). Some researchers focused on affective responses to a past visit

since tourism activities are driven by hedonic motivations (Mannell & Iso-Ahola, 1987; Nawijn, 2011). That said, if individuals show a positive response to a past visit, they are likely to revisit it. Barnes et al. (2016) found that remembered positive affect from a past visit experience is positively related to revisit intention. Given that tourists tend to seek hedonic and memorable experiences in a destination (Currie, 1997), some researchers examined the relationship between the memorability of a past visit experience and revisit intention. It was empirically revealed that memorability is positively associated with revisit intention directly as well as indirectly (e.g., Hu & Xu, 2021; Jeong & Shin, 2020). Overall, extant literature on revisit intention suggests that a more positive and memorable destination experience leads to a higher revisit intention.

Nevertheless, a positive past visit experience does not always result in high revisit intention. This is partly because the relationship between a past visit experience and revisit intention is influenced by tourist characteristics. Researchers noticed that consumers switch to other products even when they are satisfied (e.g., Keaveney, 1995; Reichheld, 1993). The novelty-seeking theory provides an explanation for this behavior. According to the novelty-seeking theory, individuals seek the optimal level of stimulation, and thus, behaviors are regulated to optimize the level of stimulation (Hebb & Thompson, 1954). Individuals seeking novelty from a product experience tend to purchase or try out new products. Novelty-seeking is closely related to tourist behaviors as it is one of the innate tourist motivations (Cohen, 1979). In the tourism context, tourists who tend to seek novelty in a destination want to experience something that has not been experienced in the past (Pearson, 1970). Thus, they tend to seek other destinations even when they are satisfied with a destination. Empirical studies found that novelty-seeking negates the relationship between destination satisfaction, destination image, and revisit intention (e.g., Assaker & Hallak, 2013; Assaker et al., 2011). However, such moderating

effect of novelty-seeking seems to decrease over time. Jang and Feng (2007) revealed that revisit intention recovered over time. Specifically, novelty-seeking was influential on mid-term and long-term revisit intention and not influential on short-term revisit intention. This implies that a destination previously visited may be perceived as novel as time elapses. Jang and Feng's study suggested that it is crucial to consider contextual factors when studying behavioral intentions.

CHAPTER 3: CONCEPTUAL DEVELOPMENT

This chapter proposes a conceptual framework of this research and discusses the foundational theoretical framework, the SOR framework. The conceptual framework consists of the relationship between the main variables (i.e., sense of presence, personal nostalgia, and revisit intention) and two moderators (i.e., temporal distance and destination satisfaction). The main conceptual framework is discussed first, followed by two moderators. Five research hypotheses are proposed.

The Main Conceptual Framework

Stimulus-organism-response framework

This research is grounded in the SOR framework. The SOR framework was proposed by Mehrabian and Russel (1974) to explain the effects of the environment on human behaviors. A stimulus refers to an external influence stimulating an individual (Eroglu et al., 2001). An organism is described as an internal state when processing a stimulus. A response indicates a consequence of the internal processes. Mehrabian and Russel argued that when individuals are exposed to an external stimulus, a response is triggered through internal processes (organism). **Figure 3.1** visualizes the SOR framework in the order of the mechanism.

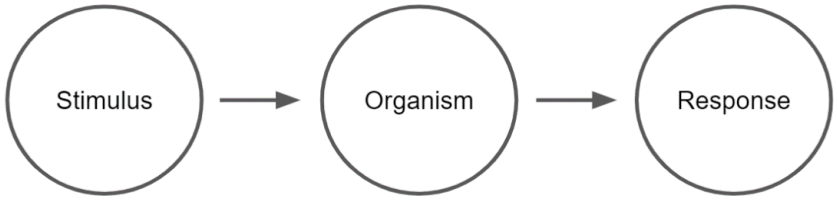

Figure 3.1 The SOR framework.

The SOR framework was originally developed to explain how individuals react to the surrounding physical environment. Consequently, researchers have employed this framework to investigate the impacts of various environmental stimuli on human behaviors. For example, Nanu et al. (2020) used interior design elements such as plants and style (contemporary vs. traditional) as external stimuli and found that they positively influenced consumers' behavioral intentions through increased satisfaction and emotions. In the meantime, several researchers attempted to extend the SOR framework beyond the physical environments. For instance, Chang (2016) examined the effects of perceived servicescape quality on consumers' behavioral intentions based on the SOR framework. Servicescape is defined as a landscape where service is provided (Bitner, 1992). Servicescape embraces both tangible and intangible components of the physical environment (Bagozzi, 1975). Chang (2016) adopted both physical and social (e.g., interactions with employees) components as stimuli and revealed their influence on consumption experiences. Chang's study showed that the SOR framework can be extended to the social environment. As advanced technologies are increasingly popular, some researchers tried to apply the SOR framework to a mediated environment. For instance, Rajaguru (2014) examined the effects of visual and auditory stimuli from motion pictures on tourist motivations. Hsiao and Tang (2021) studied the influence of social and media stimuli from an augmented reality experience on tourists' behavioral intentions. Kim et al. (2020) investigated the influence of the perceived authenticity of a VR experience on tourists' behavioral intentions. All these studies demonstrated that the SOR framework is applicable to a mediated environment.

An organism of the SOR framework differentiates this framework from a traditional input-output framework. That is, the SOR framework focuses more on the internal processes of a

stimulus than the mere relationship between a stimulus and a response (Jacoby, 2002). Specifically, Mehrabian and Russel (1974) argued that emotional responses to a stimulus play a role in deciding behaviors. The emotional responses fall into three categories: pleasure, arousal, and dominance. Pleasure refers to a good, joyful, or happy feeling (Mehrabian & Russel, 1974). Arousal describes a feeling of excitement, a feeling of stimulated, or a feeling of alert (Mehrabian & Russel, 1974). Dominance is about a feeling of unrestricted (Mehrabian & Russel, 1974). Bitner (1992) expanded this framework by including diverse psychological processes. Specifically, Bitner proposed that emotional, cognitive, and physiological responses are involved when processing a stimulus. Emotional responses include mood and attitude (Bitner, 1992). Cognitive responses relate to beliefs, categorization, and symbolic meanings (Bitner, 1992). Physiological responses refer to pain, comfort, movement, and physical fit (Bitner, 1992). Subsequent empirical studies have shown that the internal processing of a stimulus is diverse as Bitner suggested. For example, it was shown that cognitive constructs (e.g., perceived usefulness, perceived ease-of-use, and education), emotional constructs (e.g., positive emotion, escapism, and emotional involvement), and constructs that involve both cognitive and affective systems (e.g., flow and nostalgia) are engaged when processing a stimulus (e.g., An et al., 2021; Hew et al., 2018; Kim et al., 2020; Lee et al., 2014; Shin & Jeong, 2022; Ying et al., 2021).

In terms of a response of the SOR framework, Mehrabian and Russel (1974) contended that the internal processes regulate individuals to behave in either an ‘approach’ or ‘avoidance’ way. Approach behaviors mean favorable behaviors toward an object or an event, and avoidance behaviors are the opposite behaviors to approach behaviors (Manthiou et al., 2017). Thus, the SOR framework has been used to investigate the advertising, promotion, or campaign effects. In tourism, researchers have studied tourists’ behaviors based on the SOR framework. Su and

Swanson (2017) viewed tourists' environmentally responsible behavior as an approach behavior and examined the effects of destination social responsibility on it. Several researchers expanded this framework by examining attitudinal constructs as a response because they are capable of predicting actual behaviors. For instance, Chen et al. (2021) investigated tourists' behavioral intentions as a response. They studied the effects of perceived destination attributes on word-of-mouth intention and revisit intention. Similarly, Lee et al. (2014) researched the effects of environmental cues on destination loyalty based on the SOR framework. These studies showed that behavioral intentions could serve as a response in the SOR framework.

Based on the aforementioned, the SOR framework explains how human behaviors are induced by an external stimulus. Informed by the SOR framework, this research investigated the effects of a sense of presence induced by a VR destination experience on personal nostalgia and revisit intention. The literature review indicated that the SOR framework can be utilized to analyze a mediated environment as a stimulus, various psychological constructs have been explored as an organism, and behavioral intentions have been actively adopted as a response. Therefore, it was deemed appropriate to adopt a sense of presence, personal nostalgia, and revisit intention as a stimulus, an organism, and a response, respectively. **Figure 3.2** shows the relationship among sense of presence, personal nostalgia, and revisit intention according to the SOR framework as the main conceptual framework of this research. Detailed discussions on the relationship among the variables will follow.

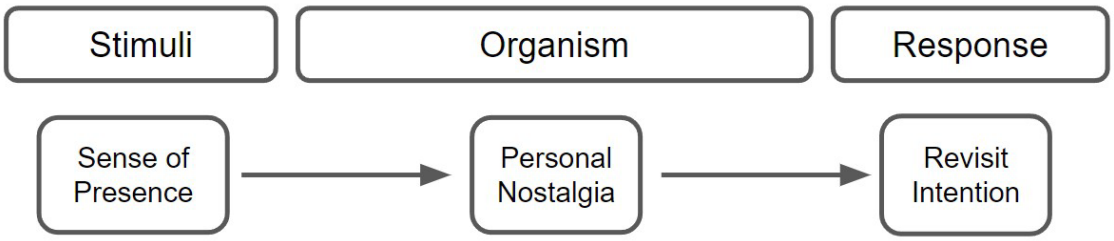

Figure 3.2 The main conceptual framework of the research.

Sense of presence, personal nostalgia, and revisit intention

Based on the literature review on revisit intention, a past destination experience is heavily involved in developing revisit intention. In other words, memories of a past destination experience influence revisit intention. In addition, extant studies have suggested that repeat visitations are motivated more emotionally than cognitively. Rather et al. (2022) showed that repeat visitors are more emotionally engaged in destination, compared to new visitors when developing revisit intention. Similarly, Yolal et al. (2017) demonstrated that compared to repeat visitors, new visitors rely more on cognitive evaluations of a destination than affective evaluations for destination loyalty. This suggests that emotional responses to a past destination experience are influential on revisit intention. Hence, this research proposed that personal nostalgia is a powerful predictor of revisit intention. Personal nostalgia is a feeling of longing for one's own past. That is, personal nostalgia is an emotional response to one's past. In addition, the nostalgia literature revealed that personal nostalgia is a motivational construct. Nostalgia often results in motivations for approach behaviors such as exploration intentions (Sedikides & Wildschut, 2016). Thus, individuals who feel nostalgia about a past destination experience desire to revisit the destination. Several researchers empirically demonstrated a positive relationship between personal nostalgia and revisit intention (e.g., Hu & Xu, 2021; Jian et al., 2021).

In addition, this research assumed that a sense of presence will increase personal nostalgia. Nostalgia is triggered by cues about the past (Havlena & Holak, 1991). Thus, personal nostalgia is evoked by cues about one's past events. According to the cue-priming theory, autobiographical memory is better retrieved in specific situations with concrete attributes that resemble a past event (Kvavilashvilli & Mandler, 2004). Hence, nostalgic feelings about a past

destination experience would be better triggered when individuals are in a situation that resembles their past destination experience. VR technology has the ability to simulate the physical environment. That is, a VR destination experience could better trigger a feeling of nostalgia about one's past destination experience compared to other forms of media. When individuals feel themselves being in a mediated environment, a sense of presence occurs (Steuer, 1992). A stronger sense of presence indicates that the mediated environment is perceived as more realistic. Hence, a past destination experience could be better retrieved when individuals feel a higher sense of presence from a VR destination experience. Some studies empirically showed a positive relationship between a VR destination experience and personal nostalgia (e.g., Lin et al., 2020; Shin & Jeong, 2022).

In this regard, this research examined the effects of a sense of presence, induced by a VR destination experience, on revisit intention through personal nostalgia as a mediator based on the SOR framework. Shin and Jeong (2022) conducted a similar study. They investigated the relationship among a virtual destination experience, personal nostalgia, and revisit intention based on the SOR framework and found that a virtual trip immersion was positively associated with nostalgia for destination, nostalgia for past life, and nostalgia for social activity. For the relationship between nostalgia and revisit intention, they discovered that only nostalgia for destination was positively related to revisit intention, suggesting that a virtual destination experience influences revisit intention, and personal nostalgia mediates the relationship. Shin and Jeong's study supports the underlying assumption of this research; however, there are still unresolved questions that require further investigation. First, the relationship between the sense of presence and personal nostalgia is not clear because Shin and Jeong adopted a different concept (i.e., virtual trip immersion) to examine the effects of a virtual destination experience.

Second, a causal relationship between the sense of presence and personal nostalgia and revisit intention remains unknown as past studies mostly examined correlations. Investigating causal relationships is especially imperative when employing the SOR framework since this framework is based on causal relationships. Therefore, three hypotheses were developed. **Figure 3.3** visualizes the main conceptual framework of this research with hypotheses.

H1: A high (vs. low) sense of presence, facilitated by a VR experience of a previously visited destination, will increase personal nostalgia.

H2: A high (vs. low) sense of presence, facilitated by a VR experience of a previously visited destination, will increase revisit intention.

H3: Personal nostalgia will mediate the relationship between sense of presence and revisit intention.

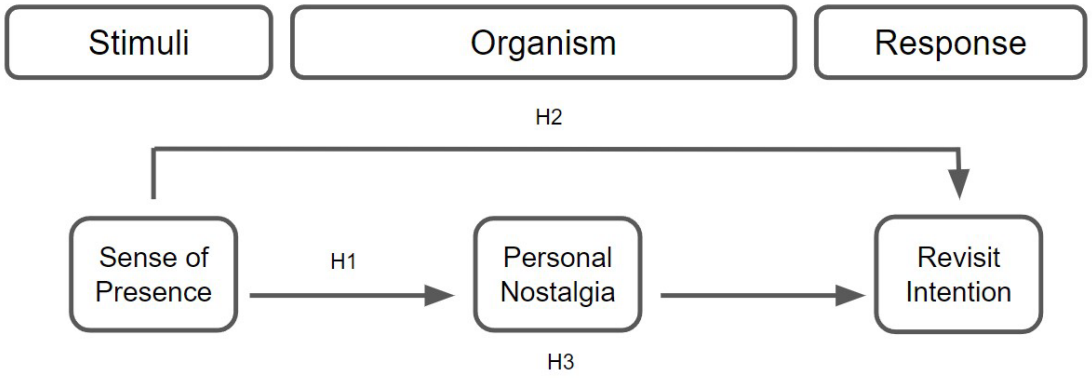

Figure 3.3 The main conceptual framework of the research with hypotheses.

Moderator 1: Temporal Distance

Temporal distance and memory

A temporal distance refers to the amount of time gap between the present moment and a target event (Bar-Anan et al., 2006). This research proposed that a temporal distance to a past destination experience moderates the relationship between the sense of presence and personal nostalgia because memories fade away over time as suggested by several theories on forgetting. For example, the trace decay theory formed by Thorndike (1913) posits that memories are formed by leaving traces. When retrieving the memories, the traces are revisited. If the memories are not revisited for a while, they fade away. According to the interference theory, memories are susceptible to influences from new information, as they tend to disrupt one another (Baddeley, 1998). Thus, recalling an event from a distant past can be more difficult than a recent event. When memories are hard to retrieve, retrieval cues become necessary to assist in the process. The retrieval failure theory developed by Tulving (1974) contends that retrieval failure occurs because of the lack of retrieval cues. Situational information is typically encoded along with new memories. Thus, situational information serves as retrieval cues to assist individuals to retrieve memories. However, the assistance of retrieval cues may not be necessary for a recent past event because individuals already have vivid memories. Therefore, it can be inferred that the effects of the sense of presence on memory recall may be weaker for a recent event than an event that occurred in the temporally distant past.

Temporal distance, sense of presence, and personal nostalgia

Referring to nostalgia literature, it is suggested that triggers related to a past event evoke personal nostalgia. The notion of nostalgia triggers is parallel to the notion of retrieval cues because nostalgic feeling is evoked based on memories. Hence, in conjunction with the discussion above, it was assumed that a sense of presence is more effective to evoke personal nostalgia when a past event is temporally distant. In other words, temporal distance to a past event moderates the relationship between the sense of presence and personal nostalgia. Hwang and Hyun (2013) examined the moderating effects of temporal distance to a past restaurant visit on the relationship between nostalgia triggers and nostalgia. They conceptualized nostalgia as an emotional construct and revealed that nostalgia triggers generated more positive emotional responses over time for past restaurant customers. In addition, positive emotions positively affected revisit intentions. While these results are in line with the assumptions of this research, the theoretical explanation regarding the relationship among temporal distance, triggers, and nostalgia is limited in their study. Also, the triggers they examined are the components of servicescape such as food, event, and environment. This leaves the relationship between the sense of presence and personal nostalgia in question in the context of tourism. In this regard, one hypothesis was developed. **Figure 3.4** visualizes the moderating effects of temporal distance on the relationship between the sense of presence and personal nostalgia.

H4: Temporal distance will moderate the relationship between sense of presence and personal nostalgia. As temporal distance to the most recent visit increases, the positive relationship between sense of presence and personal nostalgia will be stronger.

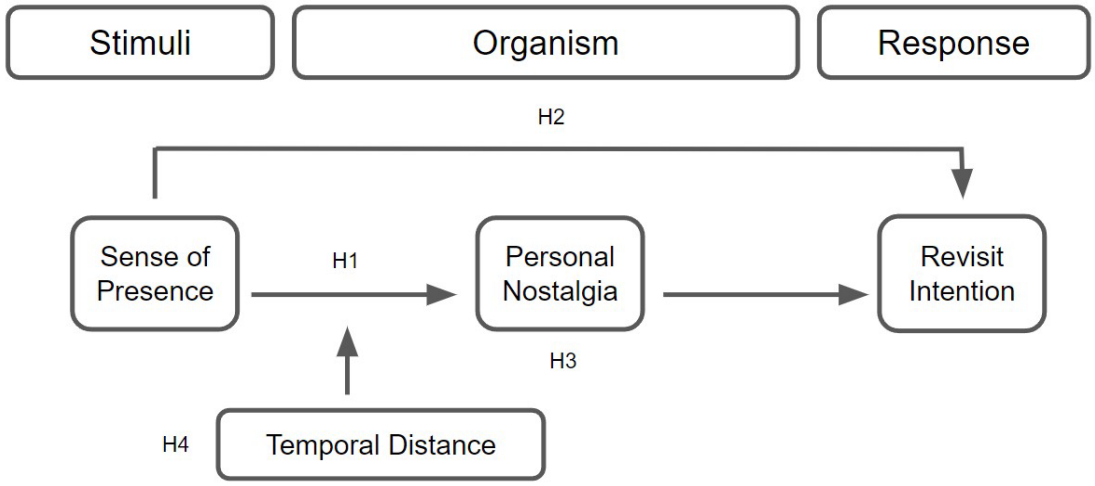

Figure 3.4 The proposed moderating effects of temporal distance.

Moderator 2: Destination Satisfaction

Satisfaction

Satisfaction is regarded as a core concept to understanding consumer experience. However, there is no consensus among scholars on the conceptualization of satisfaction. Satisfaction was initially conceptualized based on the expectancy-disconfirmation model (Millan & Esteban, 2004). According to the model, satisfaction is determined by comparing the perceived performance of a product and expectation (Um et al., 2006). If performance meets expectations, satisfaction occurs (Oliver, 1980). In contrast to this appraisal approach, some scholars argued that satisfaction is a needs-based construct (Tian-Cole & Cromption, 2003). The needs-based approach posits that satisfaction is caused by corresponding motivation (Tian-Cole & Cromption, 2003). In this case, satisfaction occurs when motives or needs are fulfilled. After all, the point of debate between the two schools of thought is whether satisfaction is a static state (i.e., needs-based) or an outcome of a psychological process (i.e., appraisal approach). However,

regardless of the debate, there seems to be general agreement that satisfaction is the final stage of consumer decision-making (Um et al., 2006).

The fact that satisfaction is the final stage of consumer decision-making differs itself from other similar concepts such as service quality, perceived value, and attitude. To be sure, service quality shares the same theoretical origin as satisfaction, but satisfaction is more affective- and experience-based, while service quality is more cognitively judged (Tian-Cole & Crompton, 2003; Tonge & Moore, 2007). Perceived value is defined as the consumer's overall assessment of the utility of a product (or service) based on perceptions of what is received and what is given (Zeithaml, 1988). This implies that the concept of perceived value centers on a trade-off between perceived benefits from a product and perceived costs associated with the product (Monroe, 1991). Satisfaction is also distinct from attitude. Kozak (2001) argued that attitude can be altered by satisfaction. Hence, it is suggested that satisfaction is a superordinate concept to service quality, perceived value, and attitude (Baker & Crompton, 2000; Um et al., 2006; Verma & Rajendran, 2017). Therefore, satisfaction is useful to understand the overall consumer experience and to predict future behaviors.

Destination satisfaction, sense of presence, and personal nostalgia

Destination satisfaction is defined as a cognitive-affective state derived from a destination experience (del Bosque & San Martin, 2008). This research suggested that destination satisfaction moderates the relationship between a sense of presence and personal nostalgia. This is because personal nostalgia about a past destination experience depends on how individuals evaluate the experience. Hu and Xu (2021) studied the relationship among memorability of a previous travel experience, personal nostalgia, and revisit intention and

showed that memorability of a previous experience positively affects the level of personal nostalgia, followed by revisit intention. This suggests that a positive evaluation of a past visit is related to a higher personal nostalgia about the past visit. As discussed above, destination satisfaction is the final stage of consumer decision-making, meaning that destination satisfaction is the tourists' comprehensive evaluation of their past destination experience. Moreover, the literature review revealed that satisfaction heavily relies on emotion. This indicates that satisfaction could better predict personal nostalgia compared to other similar concepts, given that personal nostalgia is an emotional construct. Therefore, it can be proposed that personal nostalgia about a past visit depends on the level of destination satisfaction. For example, if individuals negatively evaluate a past destination experience, they are less likely to miss the destination, thus lower personal nostalgia.

This research proposed that nostalgia about a past visit is better evoked when there is a higher sense of presence from a VR destination experience. This was because memories are better retrieved when individuals are in a situation that resembles the event. Linking to the discussion above, when individuals had a negative destination experience, unpleasant memories from the visit could be better retrieved from a higher sense of presence, resulting in lower personal nostalgia. On the contrary, when individuals have a positive destination experience, pleasant memories from the visit could be better retrieved from a higher sense of presence, resulting in higher personal nostalgia. That is, the direction of the relationship between the sense of presence and personal nostalgia depends on the level of destination satisfaction. Nevertheless, this relationship has rarely been examined. Hence, this research proposed that the relationship between the sense of presence and personal nostalgia is moderated by destination satisfaction. Examining these two moderators differentiates this research from other similar studies such as

Shin and Jeong (2022). Therefore, the following hypothesis was created. **Figure 3.5** visualizes the moderating effects of destination satisfaction on the relationship between a sense of presence and personal nostalgia.

H5: Destination satisfaction will moderate the relationship between sense of presence and personal nostalgia. As the level of destination satisfaction increases, the positive relationship between sense of presence and personal nostalgia will be stronger.

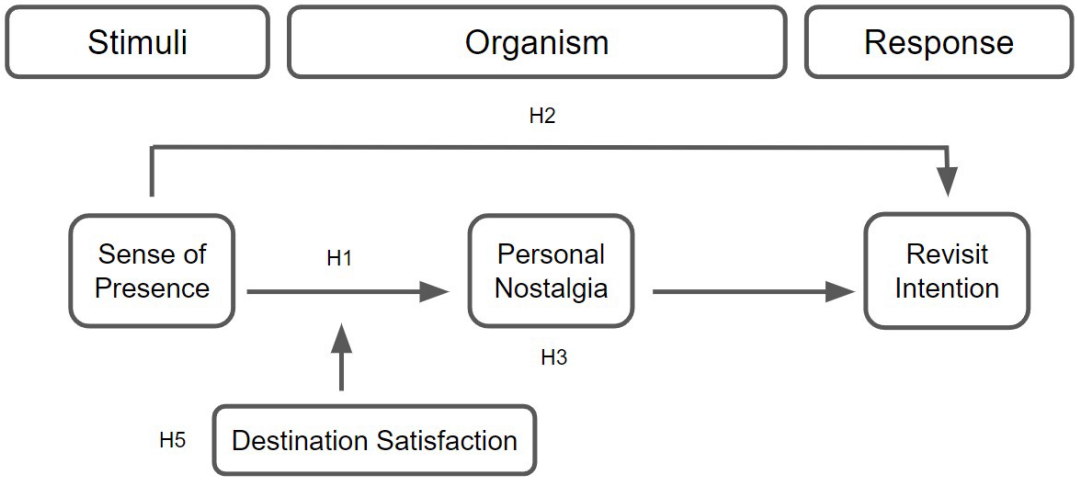

Figure 3.5 The proposed moderating effects of destination satisfaction.

Proposed Conceptual Framework

Based on the discussion above, a conceptual framework of this research was developed as shown in **Figure 3.6**. This research, informed by the SOR framework, tested if a sense of presence increases personal nostalgia, followed by revisit intention. In addition, this research proposed that temporal distance to a past destination experience and destination satisfaction moderate the relationship between the sense of presence and personal nostalgia.

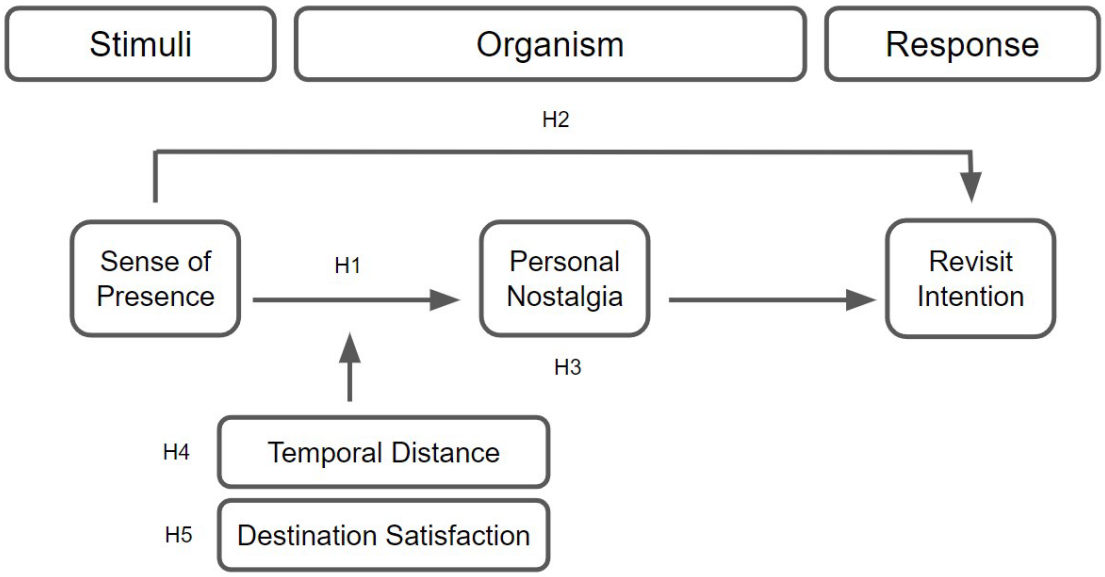

Figure 3.6 Proposed conceptual framework.

CHAPTER 4: METHODOLOGY

This chapter describes the methodology adopted in this research to test the proposed research hypotheses. First, it outlines the research paradigm adopted in this research. This is followed by an in-depth overview of the research design and instrument development and measurements. In addition, data collection procedures and data analysis methods are described.

Research Paradigm

A paradigm is defined as "patterns of beliefs and practices that regulate inquiry within a discipline by proving lenses, frames and processes through which investigation is accomplished" (Weaver & Olson, 2006, p. 460). It is crucial to discuss a research paradigm before conducting research as it guides the practice of research from designing research to data interpretation (Creswell, 2009). Scholars argued that there are three questions that need to be answered to determine paradigm: ontology, epistemology, and methodology (Guba, 1990). Ontology is about the nature of reality that researchers seek. Specifically, whether it is a probable fact to be discovered, or the mental construction of individuals (Moon & Blackman, 2014; Moses & Knutsen, 2012). Epistemology asks the way in which knowledge is created such as whether reality exists within the subject (subjectivism) or outside the subject (objectivism) (Guba & Lincoln, 1985). The combination of ontology and epistemology guides a researcher to determine methodology, which subsequently guides research procedures, tools, and techniques to gather and interpret data (Crotty, 1998; Guba & Lincoln, 1985).

This research resonates with the post-positivism research paradigm because the research questions were answered with a deductive approach. Post-positivism contends that there is a

single reality, though it is not possible for humans to perfectly understand it (Cook & Campbell, 1979). Post-positivists acknowledge that individuals cannot fully detach from the subject of interest and strive to approximate reality by striving to be as neutral as possible (Guba, 1990). In this regard, the best way to accumulate knowledge for post-positivists is a deductive method – building up hypotheses based on theory and verifying the theory (Guba & Lincoln, 2005). The data is usually gathered in an objective way such as a survey or an experiment and analyzed statistically to approximate reality in post-positivistic research (Lincoln et al., 2011). In doing so, post-positivistic research ultimately aims to generalize new knowledge to other populations (Johnson & Parry, 2015).

Research Design

This research aimed to answer four research questions: 1) What are the effects of a sense of presence, facilitated by a VR experience of a previously visited destination, on personal nostalgia and revisit intention? 2) What is the role of personal nostalgia in the relationship between the sense of presence and revisit intention? 3) What is the role of temporal distance to a past visit in personal nostalgia evocation? 4) What is the role of destination satisfaction in personal nostalgia evocation? To answer these research questions, a mixed method with an embedded design was used.

An embedded mixed method design is used when researchers need to include "qualitative or quantitative data to answer a research question within a largely quantitative or qualitative study" (Creswell & Plano Clark, 2007, p. 67). Researchers often consider the embedded design when a single data set is not sufficient, different questions need to be answered, and/or different types of data sets are needed to answer a question (Creswell & Plano Clark, 2007). This design is

useful especially in experimental design to seek explanations for the experiment findings (Creswell & Plano Clark, 2007). This research attempted to answer the research questions through an experiment. Collecting follow-up qualitative data can help better contextualize and interpret the experiment results. Therefore, this research embedded a qualitative study within an experiment (**Figure 4.1**). The interpretation of the data was thus based on quantitative results.

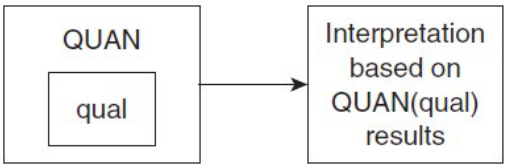

Figure 4.1 The embedded mixed method design of this research (Creswell & Plano Clark, 2007).

For the experimental study (Phase 1), a laboratory experiment was conducted. An experimental research design allows researchers to have a high degree of control of the environment and manipulation of the interested variables, thus establishing causality (Viglia & Dolnicar, 2020). Specifically, this study adopted a mixed experimental design involving a 2 (between-subjects: high vs. low sense of presence) by 2 (within-subjects: personal nostalgia and revisit intention before vs. after the research stimulus) mixed design. The mixed experimental design is expected to provide stronger statistical support for the effects of the sense of presence on personal nostalgia and revisit intention, as well as to inform the relationship between the sense of presence, personal nostalgia change, and revisit intention change. A sense of presence was manipulated through two different presentation modes (high sense of presence: a VR HMD vs. low sense of presence: an 11-inch tablet screen). The details of the research method for the experiment are described in the next section.

The qualitative study (Phase 2) was conducted using a qualitative survey. A qualitative survey is a survey consisting of a series of open-ended questions (Braun et al., 2021). Along with

other qualitative methods, a qualitative survey can generate a rich and in-depth dataset despite brief responses (Braun et al., 2021). A qualitative survey has several advantages in this study. First, it could decrease the social desirability bias because of anonymity. The social desirability bias is a tendency to respond favorably so as to impress or seem in agreement with others. This study has a high risk of this bias because participants could think that the research stimulus was created by the researcher. Through an online survey, participants can be completely anonymous when discussing the virtual destination experience. Second, it allows researchers to gather a larger sample more efficiently than an interview (Braun et al., 2021). A qualitative survey is perceived as more flexible, unobtrusive, and non-onerous than interviews (Braun et al., 2021). A larger sample is beneficial to support the statistical results from Phase 1. Lastly, it is easy to control the timing of data collection. To avoid memory fading, Phases 1 and 2 should not have a long interval.

Phase 1: Laboratory Experiment

Research stimulus

Participants watched a 360-degree video about a guided tour to New York City (NYC) as a research stimulus. NYC was chosen because of its popularity as a tourist destination. NYC is one of the most visited cities in the U.S. (Dodd, 2021). The video used in this research was created by the Sygic Travel YouTube channel, a VR tour video production studio (https://www.youtube.com/watch?v=BD0oWSM6kVc&t=234s). **Figure 4.2** shows a screenshot of the video footage. Permission to use the video was obtained from the channel owner (see **Appendix A**).

Figure 4.2 A screenshot of the video footage.

Instrument development and measurements

The data was collected through a survey. The survey consisted of a pre-stimulus section and a post-stimulus section (see **Appendix B** and **C**). The pre-stimulus section measured pre-stimulus personal nostalgia, pre-stimulus revisit intention, temporal distance to the most recent visit to NYC, and destination satisfaction. In addition, the pre-stimulus section measured novelty-seeking and place attachment as control variables for testing hypotheses related to revisit intention. Extant studies have suggested that novelty-seeking tendency and attachment to a destination influence revisit intention (e.g., Assaker et al., 2011; Yuksel et al., 2010). The post-stimulus section was implemented after the research stimulus. It asked about a sense of presence, post-stimulus personal nostalgia, post-stimulus revisit intention, and demographic information. See **Appendix D** for the summary of measurements. One attention check question was placed in the nostalgia question in both surveys to ensure data quality. Participants were asked to select a specific scale. For example, participants were asked 'Please check "Strongly Disagree" for this

attention check question'. These instructed-response items are widely used for attention check questions (Kung et al., 2018).

Three items were adapted from Tussyadiah et al. (2018) to measure revisit intention. These items have been validated in extant studies on visit intention or revisit intention to a tourist destination (e.g., Kozak & Rimmington, 2000; Phillips et al., 2013). A 7-point Likert scale was used ranging from strongly disagree to strongly agree.

Personal nostalgia was measured with three items adapted from Stephan et al. (2012). Stephan et al. used these items to measure general state nostalgic feeling. The items were modified to measure personal nostalgia for this research. For example, 'Right now, I am feeling quite nostalgic' was modified to 'Right now, I am feeling quite nostalgic about my past visit(s) to New York City'. All items were rated on a 7-point Likert scale ranging from strongly disagree to strongly agree.

A sense of presence was measured using three items adapted from Kim and Biocca (1997). Ying et al. (2021) validated these items to measure a sense of presence from a VR experience. The items were rated using a 7-point Likert scale ranging from strongly disagree to strongly agree.

For temporal distance, participants were asked the month and year of their most recent visit to NYC. Participants answered this question in an open-ended question.

Destination satisfaction was measured by asking about overall satisfaction. Participants were asked to rate the experience of their most recent visit to NYC with one question adapted from Taplin et al. (2016). Taplin et al. used this question to measure overall national park visitor satisfaction. The question was rated with a 7-point Likert scale ranging from extremely dissatisfied to extremely satisfied.

Place attachment was measured with three constructs: place identity, place dependence, and affective attachment. Each construct consisted of three items. The items were adapted from Yuksel et al., (2010). Yuksel et al. borrowed the items from Kyle et al. (2004) and modified them for their study context. All items were measured using a 7-point Likert scale ranging from strongly disagree to strongly agree.

Novelty-seeking tendency was measured using existing tourist motivation questions. Three items were adapted from Crompton (1979) and Li and Cai (2012). The items were rephrased to suit the context of this research. A 7-point Likert scale was used ranging from strongly disagree to strongly agree.

A total of five questions was included in the demographics section. These are age, gender, household income, education level, and race. The year born was asked for age with an open-ended question. Gender, household income, education level, and race were asked with multiple-choice questions.

Pretest study

The initial survey draft was reviewed by four experts specializing in social science and/or quantitative research. Feedback from the experts was mostly regarding grammar, wording, clarity of the questions, choice of scale and items, survey design, and information in the consent form. Based on the feedback, a second survey draft was developed for a pretest.

A pretest was conducted in November 2022 to check the reliability and validity of the survey and the logistics of the experiment prior to the actual data collection. A total of nine graduate students at the University of Illinois Urbana-Champaign were recruited through a convenience sampling method. All participants in the pretest experienced the identical Phase 1

data collection procedure as the actual data collection. Upon completion of the post-stimulus survey in a lab, participants were given the printed version of all sections of the survey including the Phase 2 survey and asked to provide the researcher with feedback.

A total of six participants was assigned to a high sense of presence group, and 3 participants were assigned to a low sense of presence group through randomization. The feedback from the participants was mostly related to the choice of items, grammar, and wording. For example, participants mentioned that the nostalgia question is not clear and repetitive. Thus, the nostalgia items were replaced by adapting Hu and Xu's (2021) scale to increase the clarity of the meaning of nostalgia and reduce repetitiveness. Besides, one option was added to the gender question to accommodate those who do not want to provide the information. Lastly, there were several grammar and wording corrections based on feedback from native English speakers.

Ensuring a proper temporal interval between pre-stimulus and post-stimulus was important to avoid a demand characteristic as the research stimulus runs only about 5 minutes. A demand characteristic is a bias occurring when research participants can guess the purpose of the research. Participants in the pretest had at least a 2-day interval between pre-stimulus and post-stimulus. The participants recommended an average of 3.5 days for the interval. Based on the feedback, at least a 4-day interval was implemented in the actual data collection. That is, participants visited the lab and conducted the post-stimulus survey at least 4 days after the pre-stimulus survey was completed.

Participants and procedures

Participants were recruited from a population in Champaign, Illinois. A recruitment post was distributed to the population through a University of Illinois Urbana-Champaign campus

weekly newsletter, various community websites, and a Facebook advertisement. The campus weekly newsletter was used to reach out to the college population. The newsletter targets students, staff, and faculty in the university. Various community websites included community pages on Facebook and Reddit. The Facebook advertisement targeted all residents in Champaign, Illinois. Individuals voluntarily scheduled an in-person laboratory session through a Qualtrics survey embedded in the recruitment post. Those who were over 18, who had visited NYC, who were not a resident of NYC, and who could watch a 360-degree video without any medical issues were eligible to participate in the research. The Institutional Review Board at the University of Illinois Urbana-Champaign approved this research (**Appendix E**). The data collection occurred between December 2022 and March 2023.

The pre-stimulus section of the survey was implemented online when participants signed up for an in-person laboratory session. The survey was shown after the screening questions and the consent form. After the pre-stimulus section, participants were directed to schedule an in-person session. Each participant was assigned a four-digit participant number for the identification process at the laboratory at the end of the pre-stimulus section.

At the laboratory, participants were asked to access the post-stimulus section of the survey using their own mobile device through a provided QR code. Participants were asked to put the four-digit participant number at the beginning of the post-stimulus section. Then, participants were randomly assigned to either a high or low sense of presence group via the logic set in Qualtrics. Once assigned to a condition, participants watched a 360-degree video about a guided tour to NYC for 5 minutes. Both groups watched the same video but through different presentation modes. A high sense of presence group watched the video on an Oculus Go VR HMD. A low sense of presence group watched the video on an 11-inch iPad screen. After

watching the video, participants continued the post-stimulus survey. Upon completion of the survey, participants were rewarded with a coffee coupon. The target sample size for each group was at least 60, totaling at least 120 valid responses.

Data analyses

The data was extracted from the Qualtrics website and transposed to SPSS, a statistical software. The responses that failed attention check questions were removed for data cleaning. After the data cleaning procedure, descriptive statistical analyses were performed to understand data distribution. To test hypotheses, a series of statistical analyses was performed. This included the independent-samples t-test and Hayes's PROCESS macro. A t-test allows for assessing the causal relationship between two variables. An independent-samples t-test examines the mean difference between two independent groups. Hayes's PROCESS macro is used to analyze the moderating and mediating effects. Hayes's PROCESS conducts regression analyses including combinations of mediators, moderators, and covariates. Specifically, Model 1 and Model 4 in Hayes's PROCESS procedures were conducted. See **Table 4.1** for details about the statistical approach for each hypothesis.

Table 4.1 Statistical approach for each hypothesis

Hypotheses	Statistical Approach
H1: A high (vs. low) sense of presence, facilitated by a VR experience of a previously visited destination, will increase personal nostalgia.	Independent-samples t-test
H2: A high (vs. low) sense of presence, facilitated by a VR experience of a previously visited destination, will increase revisit intention.	Independent-samples t-test

Table 4.1 (cont.)

Hypotheses	Statistical Approach
H3: Personal nostalgia will mediate the relationship between sense of presence and revisit intention.	Model 4 Hayes's PROCESS
H4: Temporal distance will moderate the relationship between sense of presence and personal nostalgia. As temporal distance to the most recent visit increases, the positive relationship between sense of presence and personal nostalgia will be stronger.	Model 1 Hayes's PROCESS
H5: Destination satisfaction will moderate the relationship between sense of presence and personal nostalgia. As the level of destination satisfaction increases, the positive relationship between sense of presence and personal nostalgia will be stronger.	Model 1 Hayes's PROCESS

Phase 2: Qualitative Survey

Instrument development

The survey consisted of several open-ended questions about the virtual NYC experience from the lab experiment. The survey consisted of three parts (see **Appendix F**). In the first part, there were three questions about the impact of the virtual NYC experience on emotions, memory retrieval about past visit(s) to NYC, and nostalgia evocation about past visit(s) to NYC. The second part of the survey was about the impact of the virtual NYC experience on attitude changes. In the third part of the survey, two questions were asked about the impact of the virtual NYC experience on behavioral intention changes. The responses from this survey were used to supplement the results from Phase 1 about the relationship among the sense of presence, personal nostalgia, and revisit intention. At the end of the survey, demographic information was asked including age, gender, household income, education level, and race. The types of questions for demographics were identical to the questions in Phase 1. In addition to the demographic

questions, participants were asked which experimental group they were assigned in Phase 1 in order to understand the effects of different presentation modes. This question was asked using a multiple-choice question.

Pretest study

All survey questions in Phase 2 were reviewed by the same four experts and pretest participants in Phase 1. The initial survey draft was reviewed by the experts first. The feedback from the experts was mostly about grammar and wording. Based on the feedback, the second draft was developed and reviewed by participants in the pretest. The feedback from participants in the pretest was mostly about wording and logistics. For example, it was suggested to clearly state that this survey is not connected to surveys in which participants responded in Phase 1 in order to increase the quality of the data. Also, it was suggested to distribute the survey right after the lab session to increase the response rate and to ensure the quality of the data as the virtual NYC experience will fade away quickly. The final draft was developed and implemented based on the feedback.

Participants and procedures

Participants in Phase 2 were recruited from participants in Phase 1. A recruitment email was emailed to Phase 1 participants after their lab session within a day to avoid memory fading. The recruitment email was sent only once. Individuals voluntarily participated in Phase 2 through a Qualtrics survey embedded in the recruitment email. Upon completion, participants had a chance to enter a drawing for one of ten $20 Amazon Gift Cards. This phase targeted at least 10 responses for each between-subject group.

Data analyses

The responses were extracted from the Qualtrics website and transposed to Microsoft Excel. Content analysis was employed to analyze the data. Content analysis is appropriate for this phase because it can capture a rich sense of concepts as well as allows statistical inferences as it is a qualitative method but can be subjected to quantitative data analysis (Insch & Moore, 1997). Berelson (1952) described content analysis as a "research technique for the objective, systematic, and quantitative description of the manifest content of communication" (p. 18). Content analysis involves an examination of textual data for patterns and structures, category development with the key features, and construct development for interpretation (Gray & Densten, 1998; Shoemaker & Reese, 1996).

Two researchers were involved in qualitative data analysis to ensure internal validity. The analysis involved several steps. First, both researchers reviewed the data individually to have a general understanding of the data. Second, a codebook was developed through a discussion between the researchers. Lastly, data were coded based on the codebook. One researcher conducted an initial coding, and the other researcher reviewed the initial coding. Conflicting views were resolved after discussion. The codebook was developed based on the following procedures. Initially, several categories were developed according to the proposed research variables, and then new categories were added if there were themes more than one participant mentioned. The details of the coding procedure were as follows. Each question in the survey asked participants to answer 'yes' or 'no' first and then asked to provide an explanation. Thus, the 'yes' or 'no' answer was coded first to classify groups. Then, responses were further examined to code explanations under categories for each group.

CHAPTER 5: RESULTS

This chapter presents the results of this research. This chapter consists of two sections: results of Phase 1 and Phase 2. For Phase 1, the data cleaning process and manipulation checks are described, followed by participants profile, descriptive statistics and hypotheses testing. For Phase 2, participants profile is presented first, and the results are followed.

Phase 1: Laboratory Experiment

Data cleaning and manipulation checks

A total of 119 responses were collected. Among them, six responses in the pre-stimulus survey and six responses in the post-stimulus survey failed the attention check questions. Specifically, among them, two responses were in the low sense of presence (LP) group and four responses were in the high sense of presence (HP) group in the post-stimulus survey. After cleaning those responses, a total of 107 responses were included in the data analysis. For each between-subject group, a total of 47 and 60 responses were in the LP group and the HP group, respectively.

To examine the effectiveness of the manipulation of the two levels of the sense of presence for the between-subject design, an independent-samples t-test was conducted on the sense of presence. The three items of the sense of presence were summed and averaged. Assumptions for the independent-samples t-test were checked before the test. Three assumptions of an independent-samples t-test are: 1) independence, 2) normality, and 3) homogeneity of variances (Myers & Well, 2003). Participants were randomly assigned to one of the two

between-subject groups; thus, the assumption of independence was met. To check normality, a Shapiro-Wilk test was performed since the sample size of one group was less than 50 (Mishra et al., 2019). The data is not normally distributed when the test result is significant ($p < .05$). The results showed that the data were normally distributed in both groups (LP: $p = .293$, HP: $p = .110$). A Levene's test was performed to test homogeneity of variance. The assumption of homogeneity of variance is violated when the test result is significant ($p < .05$). The results showed that the assumption of homogeneity was not violated ($p = .302$). Thus, the data was deemed appropriate for an independent-samples t-test. The result revealed that a sense of presence was significantly different between the two between-subject groups ($t(105) = -3.00$, $p = .003$, $d = 1.22$). Specifically, the HP group ($M = 5.19$, $SD = 1.19$) showed a significantly higher sense of presence than the LP group ($M = 4.48$, $SD = 1.34$). This suggests that the manipulation was successful.

Participants profile

After cleaning the data and checking the manipulation, a total of 107 responses were included in the descriptive data analysis. Participants were asked their demographic information at the end of the post-stimulus survey including gender, household income, education level, race, and age. The average age of the participants was 33.7 ($SD = 15.1$), ranging from 18 to 84 years old. Over half of the participants were female (68.2%) and white (57.9%). The household income and education level were relatively evenly distributed. See **Table 5.1** for the details of participants profile of Phase 1.

Table 5.1 Participants profile of Phase 1

Variables	Categories	Frequency	Percentage
Gender	Male	34	31.8
	Female	73	68.2
	Other	0	0
	Decline to answer	0	0
Income	Less than $20,000	7	6.5
	$20,000 to $34,999	10	9.3
	$40,000 to $59,999	10	9.3
	$60,000 to $79,999	17	15.9
	$80,000 to $99,999	8	7.5
	$100,000 to $119,999	10	9.3
	$120,000 to $149,999	14	13.1
	$150,000 to $199,999	16	15.0
	more than $200,000	6	5.6
	Decline to answer	9	8.4
Education	Less than high school	0	0
	High school graduate	21	19.6
	Some college but no degree	19	17.8
	College degree	4	3.7
	Bachelor's degree	17	15.9
	Master's degree	31	29.0
	Doctorate/Ph.D. degree	14	13.1
	Professional degree	1	.9
	Other	0	0
	Decline to answer	0	0
Race	Black or African American	1	.9
	Native American/ Alaska Native	1	.9
	Native Hawaiian/ Pacific Islander	0	0
	Asian	31	29.0
	White/ European American	62	57.9
	Other	9	10.3
	Decline to answer	1	.9
Age	M: 33.7, SD: 15.1, Median: 28.0, Min: 18, Max: 84		

Participants profile by groups

Table 5.2 displays the details of participants profile of the two between-subject groups. A chi-square test of independence was performed to compare the demographic variables measured with a multiple-choice question between the between-subject groups. To meet the assumption for the chi-square test, some categories in education and race were collapsed so that all cell

frequencies become greater than five (McHugh, 2012). For education, participants with a bachelor's degree or lower were grouped as lower education, and those with bachelor's degree and higher were grouped as higher education, based on the median value. Race was divided into white and non-white groups. The income variable was also regrouped into two categories: participants with less than $100,000 were grouped as lower income, and those with the income $100,000 and more were grouped as higher income, based on the median. The results showed that there was no statistically significant difference in demographics between the two between-subject groups (gender: $\chi 2(1) = .199$, $p = .656$; income: $\chi 2(1) = .708$, $p = .400$; education: $\chi 2(1) = .1.12$, $p = .290$; race: $\chi 2(1) = 1.19$, $p = .275$). An independent-samples t-test was conducted on age. The result showed that there was no significant difference in age ($t(105) = -1.30$, $p = .196$, $d = 15.1$). This suggests that there was no sample difference between the two between-subject groups.

Table 5.2 Participants profile of Phase 1 by groups

		LP Group (n = 47)		**HP Group (n = 60)**	
Variables	**Categories**	**Frequency**	**%**	**Frequency**	**%**
Gender	Male	16	34.0	18	30.0
	Female	31	66.0	42	70.0
	Other	0	0	0	0
	Decline to answer	0	0	0	0
Income	Less than $20,000	4	8.5	3	5.0
	$20,000 to $34,999	3	6.4	7	11.7
	$40,000 to $59,999	8	17.0	2	3.3
	$60,000 to $79,999	8	17.0	9	15.0
	$80,000 to $99,999	2	4.3	6	10.0
	$100,000 to $119,999	3	6.4	7	11.7
	$120,000 to $149,999	6	12.8	8	13.3
	$150,000 to $199,999	5	10.6	11	18.3
	more than $200,000	3	6.4	3	5.0
	Decline to answer	5	10.6	4	6.7

Table 5.2 (cont.)

		LP Group (n = 47)		HP Group (n = 60)	
Variables	**Categories**	**Frequency**	**%**	**Frequency**	**%**
Education	Less than high school	0	0	0	0
	High school graduate	7	14.9	14	23.3
	Some college but no degree	13	27.7	6	10.0
	College degree	2	4.3	2	3.3
	Bachelor's degree	6	12.8	11	18.3
	Master's degree	14	29.8	17	28.3
	Doctorate/Ph.D. degree	5	10.6	9	15.0
	Professional degree	0	0	1	1.7
	Other	0	0	0	0
	Decline to answer	0	0	0	0
Race	Black or African American	0	0	1	1.7
	Native American/ Alaska Native	0	0	1	1.7
	Native Hawaiian/ Pacific Islander	0	0	0	0
	Asian	10	21.3	21	35.0
	White/ European American	30	63.8	32	53.3
	Other	6	12.8	5	8.4
	Decline to answer	1	2.1	0	0
LP Age	M: 31.6, SD: 14.1, MD: 26.0, Min: 18, Max: 84				
HP Age	M: 35.4, SD: 15.8, MD: 29.5, Min: 19, Max: 72				

Descriptive statistics

A total of five variables was discussed in this research: revisit intention, personal nostalgia, sense of presence, destination satisfaction, and temporal distance. Descriptive statistical analyses of each variable were performed, including mean, standard deviation, skewness, and kurtosis. A Kolmogorov-Smirnov test was conducted to check the normality of the data distribution because the sample size was larger than 50 (Mishra et al., 2019). The internal consistency of each measurement scale was examined for the constructs with multiple items using Cronbach's alpha. A Cronbach's alpha value of 0.6 or higher is considered acceptable (Cronbach, 1951; Hajjar, 2018). **Table 5.3** summarizes descriptive statistics.

The result showed that all items for revisit intention, personal nostalgia, sense of presence, and destination satisfaction had mean values larger than 4 on a 7-point scale. This indicates that participants in this research averagely had a high revisit intention to NYC, felt nostalgic about their past visit to NYC, had a high satisfactory experience in NYC, and felt a high sense of presence. Comparing the two within-subject groups, revisit intention and personal nostalgia were similarly high both before and after the research stimulus. The average temporal distance to the most recent visit to NYC was 1606.7 (Min: 37.4, Max: 9398.5) days. This means that participants' last visit to NYC was on average around 4 years ago, ranging from around one month to 26 years.

Given that the assumption of normality is violated in most cases in social sciences, the absolute values of skewness and kurtosis indices fall in the range between – 2 and +2 are deemed acceptable (Gravetter & Wallnau, 2014; Trochim & Donnelly, 2006). A Kolmogorov-Smirnov test revealed that the data of all items were not normally distributed ($p < .05$). The results showed that the skewness and kurtosis indices for all variables fell within the range between -2 and 2 except for the pre- and post-stimulus revisit intention, destination satisfaction, temporal distance, and novelty-seeking. This suggests that for most variables, skewness and kurtosis are acceptable. Meanwhile, the skewness indices for the pre- and post-stimulus revisit intention and novelty-seeking fell outside the range between -2 and 2, and the kurtosis indices were larger than 8. This means that the distribution of the data for the variables was highly skewed, and the dataset had highly heavier tails than normal. In terms of destination satisfaction and temporal distance, the skewness indices were less than the threshold (± 2), but the kurtosis indices were larger than the threshold (± 2). This indicates that the skewness was acceptable, while the dataset had heavier

tails than normal. Cronbach's alpha coefficients for all variables with multiple items were larger than 0.6, indicating that all scales had an acceptable internal consistency.

Table 5.3 Descriptive statistics

Measurement	M	SD	Skewness	Kurtosis	Kolmogorov -Smirnov	Cronbach's α
Pre-Revisit Intention						
Item 1	6.30	1.13	-2.39	6.84	.311***	
Item 2	6.26	1.26	-2.61	7.57	.300***	.839
Item 3	6.51	.840	-3.55	19.0	.335***	
Pre-Personal Nostalgia						
Item 1	5.32	1.48	-.853	.355	.181***	
Item 2	5.07	1.63	-.637	-.300	.166***	.901
Item 3	5.76	1.29	-1.43	2.25	.248***	
Post-Revisit Intention						
Item 1	6.31	1.17	-2.65	8.41	.312***	
Item 2	6.32	1.20	-2.66	8.26	.332***	.953
Item 3	6.50	.985	-3.61	17.0	.350***	
Post-Personal Nostalgia						
Item 1	5.60	1.47	-1.34	1.98	.183***	
Item 2	5.50	1.50	-1.31	1.54	.220***	.899
Item 3	5.83	1.34	-1.70	3.20	.270***	
Sense of Presence						
Item 1	5.13	1.64	-.963	.273	.225***	
Item 2	5.41	1.40	-1.17	1.58	.226***	.644
Item 3	4.08	1.89	-.115	-1.36	.181***	
Place Identity						
Item 1	3.50	2.08	.379	-1.16	.184***	
Item 2	3.72	2.05	.220	-1.27	.182***	.929
Item 3	3.74	2.06	.201	-1.27	.184***	
Place Dependency						
Item 1	3.22	1.64	.422	-.640	.182***	
Item 2	4.11	1.86	-.122	-1.16	.169***	.787
Item 3	3.29	1.71	.298	-.782	.139***	
Affective Attachment						
Item 1	4.21	1.88	-.095	-1.08	.131***	
Item 2	3.78	2.04	.161	-1.29	.182***	.946
Item 3	3.54	2.03	.167	-1.29	.164***	
Novelty-Seeking						
Item 1	6.37	1.00	-2.69	9.94	.313***	
Item 2	6.19	1.08	-2.15	6.43	.254***	.733
Item 3	6.39	.998	-2.72	10.3	.327***	

Note: *** $p < .001$, ** $p < .01$, * $p < .05$

Table 5.3 (cont.)

Measurement	M	SD	Skewness	Kurtosis	Kolmogorov -Smirnov	Cronbach's α
Destination Satisfaction	6.02	1.34	-1.89	3.32	.317***	N/A
Temporal Distance	1606.7	1846.8	1.99	4.64	.198***	N/A

Note: *** p < .001, ** p < .01, * p < .05

The descriptive statistics were examined and compared between the two between-subject groups. **Table 5.4** displays the descriptive statistics by groups. The results showed that mean values of revisit intention, personal nostalgia, and sense of presence in the HP group were mostly higher than in the LP group. The standard deviation of all data in both groups fell within the range between -2 and +2. The distribution of all data in both groups was not normal ($p < .05$).

Table 5.4 Descriptive statistics by groups

Measurement	LP			HP		
	M	SD	Shapiro-Wilk	M	SD	Shapiro-Wilk
Pre-Revisit Intention						
Item 1	6.23	1.39	.594***	6.35	.899	.720***
Item 2	6.17	1.43	.602***	6.33	1.11	.639***
Item 3	6.36	1.07	.537***	6.63	.581	.636***
Post-Revisit Intention						
Item 1	6.28	1.25	.642***	6.33	1.11	.602***
Item 2	6.28	1.28	.619***	6.35	1.15	.602***
Item 3	6.47	1.04	.546***	6.52	.948	.519***
Pre-Personal Nostalgia						
Item 1	5.13	1.62	.897**	5.47	1.35	.883***
Item 2	4.94	1.76	.904**	5.17	1.53	.908***
Item 3	5.81	1.21	.796***	5.72	1.35	.826***
Post-Personal Nostalgia						
Item 1	5.55	1.61	.809***	5.63	1.37	.831***
Item 2	5.49	1.53	.826***	5.50	1.49	.836***
Item 3	5.81	1.30	.817***	5.85	1.38	.739***
Sense of Presence						
Item 1	4.47	1.68	.922**	5.65	1.41	.801***
Item 2	5.13	1.35	.857***	5.63	1.41	.827***
Item 3	3.83	1.91	.893**	4.28	1.87	.906***

Note: *** p < .001, ** p < .01, * p < .05

Hypotheses testing

The effects of the sense of presence on personal nostalgia and revisit intention were examined using an independent-samples t-test. The three items of personal nostalgia and revisit intention were summed and averaged for the test. The three assumptions for the independent-samples t-test were checked before the test.

Hypothesis 1 proposed that a high (vs. low) sense of presence, facilitated by a VR experience of a previously visited destination, will increase personal nostalgia. A Shapiro-Wilk test revealed that the data was not normally distributed in both groups (LP: $p < .001$, HP: $p < .001$). The normality assumption was violated, but an independent-samples t-test was carried out as the t-test is robust to violations of normality with respect to Type I error (Rasch & Guiard, 2004; Wiedermann & von Eye, 2013). A Levene's test showed that there was homogeneity of variances ($F = .538$, $p = .465$). An independent-samples t-test revealed that there was no significant difference in post-stimulus personal nostalgia between the two between-subject groups ($t(105) = -.172$, $p = .864$, $d = 1.32$). This indicates that a high sense of presence did not increase personal nostalgia. Thus, hypothesis 1 was not supported.

The effects of the sense of presence on personal nostalgia change were examined using an independent-samples t-test. Personal nostalgia change was calculated by subtracting pre-stimulus personal nostalgia from post-stimulus personal nostalgia. A Shapiro-Wilk test revealed that the data were normally distributed in the HP group only (LP: $p = .030$, HP: $p = .482$). A Levene's test showed that there was homogeneity of variances ($F = .958$, $p = .330$). The result revealed that there was no significant difference in personal nostalgia change between the two between-subject groups ($t(105) = .537$, $p = .592$, $d = 1.10$). This indicates that a sense of

presence did not cause the change in personal nostalgia between pre- and post-stimulus, supporting the results about the effects of the sense of presence on personal nostalgia.

Hypothesis 2 proposed that a high (vs. low) sense of presence, facilitated by a VR experience of a previously visited destination, will increase revisit intention. A Shapiro-Wilk test revealed that the data was not normally distributed in both groups (LP: $p < .001$, HP: $p < .001$). A Levene's test showed that there was homogeneity of variances ($F = .552$, $p = .459$). An independent-samples t-test revealed that there was no significant difference in post-stimulus revisit intention between the two between-subject groups ($t(105) = -.284$, $p = .777$, $d = 1.08$). This suggests that a sense of presence did not increase revisit intention. Thus, hypothesis 2 was not supported.

Extant studies have suggested that novelty-seeking tendency and attachment to a destination influence revisit intention (e.g., Assaker et al., 2011; Yuksel et al., 2010). Thus, the effects of a sense of presence on post-stimulus revisit intention were investigated with a one-way ANCOVA controlling novelty-seeking and place attachment. The result revealed that the effects of the sense of presence on post-stimulus revisit intention remained insignificant ($F = .150$, $p = .699$, partial $\eta^2 = .002$). This aligns with the hypothesis testing result above.

In terms of the effects of the sense of presence on revisit intention change, a Shapiro-Wilk test revealed that the data was not normally distributed in both groups (LP: $p < .001$, HP: $p < .001$). A Levene's test revealed that there was homogeneity of variances ($F = .216$, $p = .643$). An independent-samples t-test revealed that there was no significant difference in revisit intention change between the two between-subject groups ($t(105) = .780$, $p = .437$, $d = .816$). This indicates that a sense of presence did not cause the change in revisit intention between pre-

and post-stimulus, supporting the results about the effects of the sense of presence on revisit intention.

The effects of the sense of presence on revisit intention change were investigated with a one-way ANCOVA controlling novelty-seeking and place attachment. The result revealed that the effects of the sense of presence on revisit intention change remained insignificant ($F = .826$, $p = .366$, partial $\eta^2 = .009$). This aligns with the hypothesis testing result above.

Hypothesis 3 assumed that personal nostalgia will mediate the relationship between the sense of presence and revisit intention. Model 4 in Hayes's PROCESS macro was conducted on the pooled sample (combining the LP group and HP group) for the mediating effects of personal nostalgia. The PROCESS is based on regression analysis; thus, the four assumptions for regression analysis were checked. The four assumptions are: 1) linearity, 2) normality of residuals, 3) homoscedasticity, and 4) independence (Myers & Well, 2003). The assumption checks were conducted on the relationship between the sense of presence and post-stimulus revisit intention first. The scatterplot showed a linear relationship with several outliers (**Figure 5.1**). A Durbin-Watson test was performed to check the independence of observations. A value of approximately 2 indicates that there is no correlation between residuals (Myers & Well, 2003). The results showed that there was independence of residuals by a statistic of 2.06. A visual inspection of a plot of standardized residuals versus standardized predicted values showed that there was homoscedasticity. Residuals were normally distributed as assessed by visual inspection of a normal probability plot.

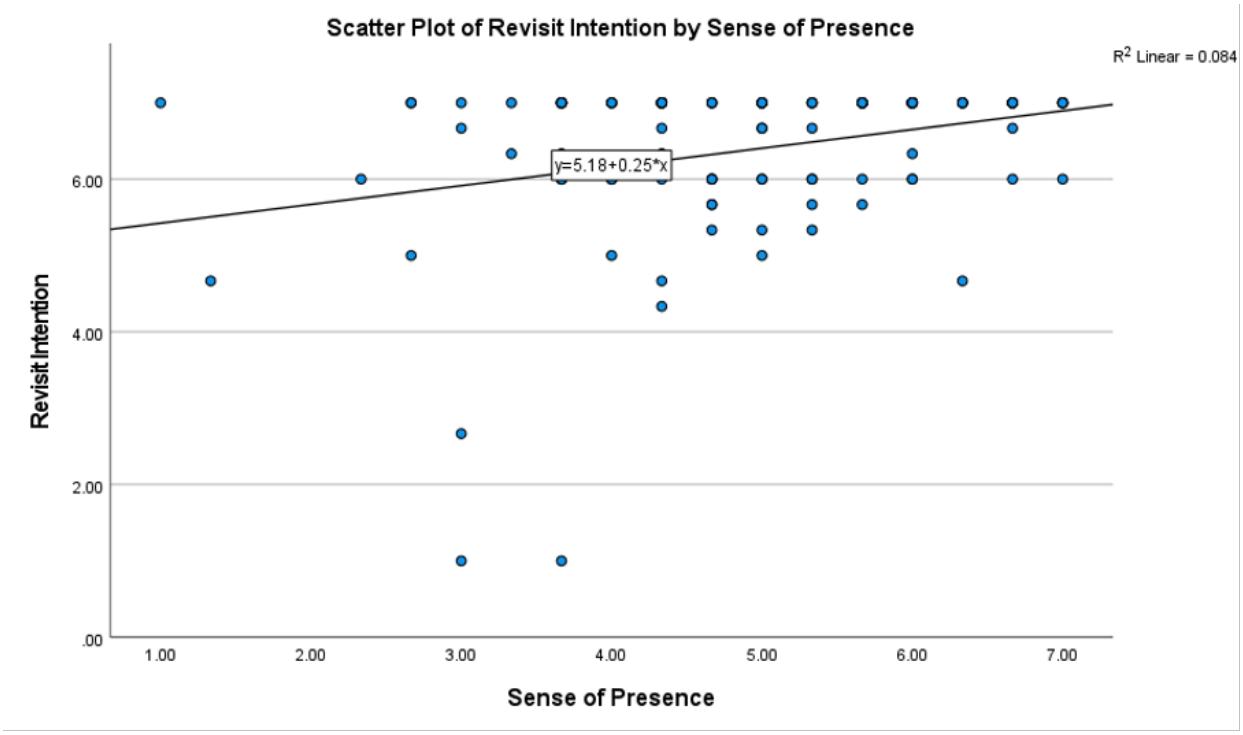

Figure 5.1 Scatter plot of revisit intention by sense of presence.

The assumption checks on the relationship between the sense of presence and post-stimulus personal nostalgia were performed. The scatterplot showed a linear relationship with several outliers (**Figure 5.2**). A Durbin-Watson test showed that there was independence of residuals by a statistic of 1.68. A visual inspection of a plot of standardized residuals versus standardized predicted values showed that there was homoscedasticity. Residuals were normally distributed as assessed by visual inspection of a normal probability plot.

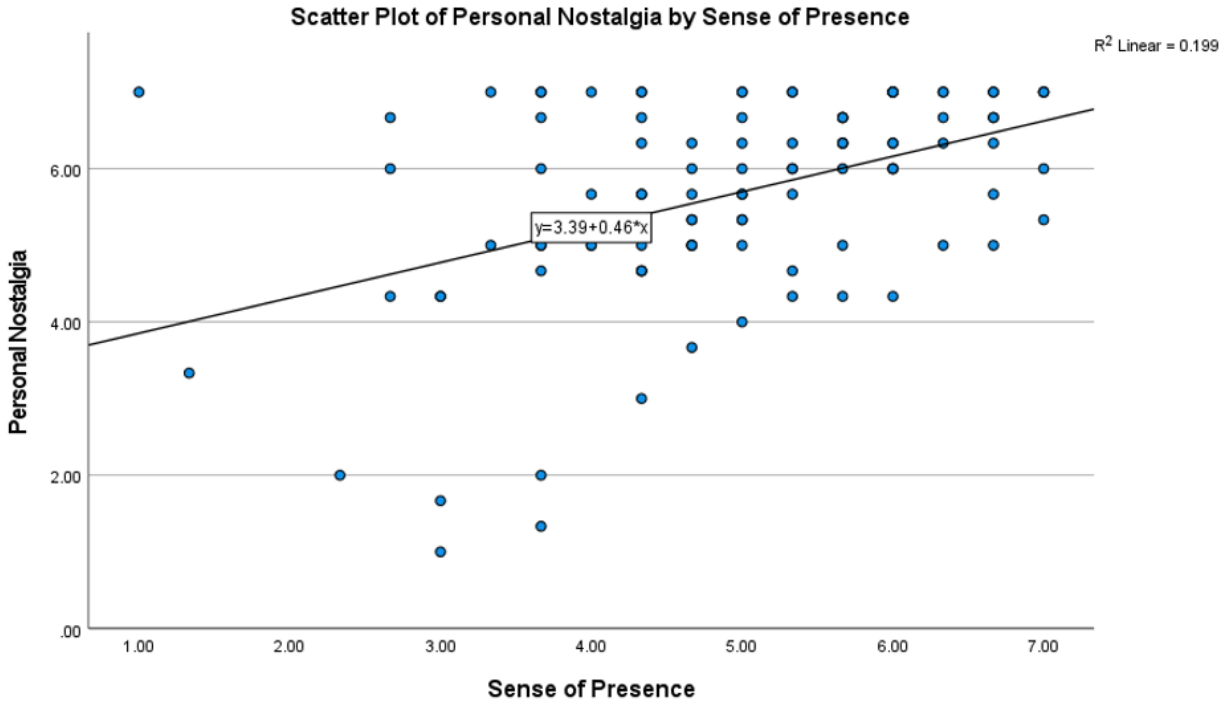

Figure 5.2 Scatter plot of personal nostalgia by sense of presence.

The assumption checks on the relationship between post-stimulus revisit intention and post-stimulus personal nostalgia were performed. The scatterplot showed a linear relationship with several outliers (**Figure 5.3**). A Durbin-Watson test showed that there was independence of residuals by a statistic of 2.13. A visual inspection of a plot of standardized residuals versus standardized predicted values showed that there was homoscedasticity. Residuals were normally distributed as assessed by visual inspection of a normal probability plot. Based on the above, the PROCESS was deemed appropriate for the analysis.

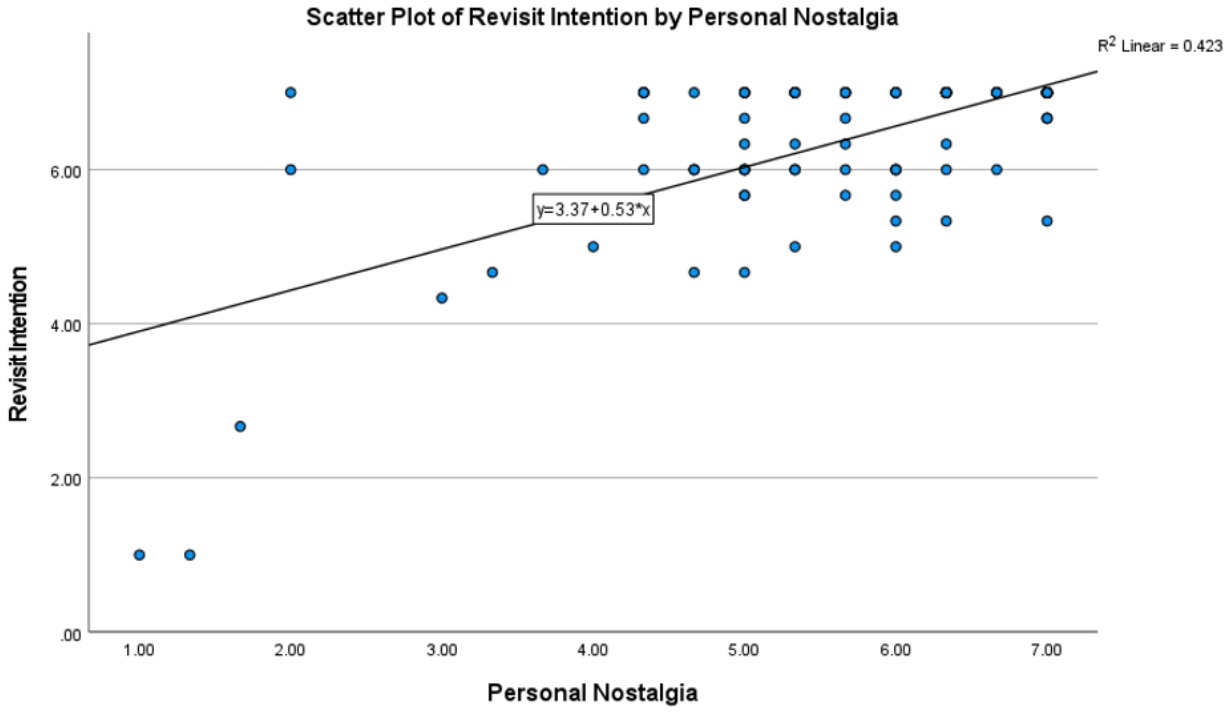

Figure 5.3 Scatter plot of revisit intention by personal nostalgia.

The result showed that there was a significant indirect effect (b = .533, t = 7.83, p < .001) but no significant direct effect (b = -.001, t = -.012, p = .990) of the sense of presence on post-stimulus revisit intention in presence of a mediator. The direct effect of the sense of presence on personal nostalgia was significant (b = .462, t = 5.10, p < .001). This indicates that post-stimulus personal nostalgia fully mediated the relationship between the sense of presence and post-stimulus revisit intention. Thus, hypothesis 3 was supported. See **Table 5.5** for the details of the mediating effects of personal nostalgia.

Table 5.5 Mediating effects of personal nostalgia between sense of presence and revisit intention

Relationship	Total Effect	Direct Effect	Indirect Effect	Confidential Interval		*t*
				Lower	Upper	
Sense of Presence -> Personal Nostalgia -> Revisit Intention	.245**	-.001	.246***	.072	.485	7.83

Note: *** p < .001, ** p < .01, * p < .05

The same analysis was conducted controlling novelty-seeking and place attachment because they tend to influence revisit intention (Assaker et al., 2011; Yuksel et al., 2010). The result showed that there was a significant indirect effect (b = .451, t = 5.60, p < .001) but no significant direct effect (b = -.004, t = -.055, p = .957) of the sense of presence on post-stimulus revisit intention in presence of a mediator. The direct effect of the sense of presence on personal nostalgia was significant (b = .340, t = 3.94, p < .001). These results are in line with Hayes's PROCESS results without the control variables above, even though the p-value for the total effect decreased (p = .053). Therefore, post-stimulus personal nostalgia still fully mediated the relationship between the sense of presence and post-stimulus revisit intention. See **Table 5.6** for the details of the mediating effects of personal nostalgia with control variables.

Table 5.6 Mediating effects of personal nostalgia between sense of presence and revisit intention controlling novelty-seeking and place attachment

Relationship	Total Effect	Direct Effect	Indirect Effect	Confidential Interval		*t*
				Lower	Upper	
Sense of Presence -> Personal Nostalgia -> Revisit Intention	.149	-.004	.153***	.032	.336	5.60

Note: *** p < .001, ** p < .01, * p < .05

The same analysis was performed for the mediating effects of personal nostalgia change on the relationship between the sense of presence and revisit intention change. The assumptions

were checked on the relationship between the sense of presence and revisit intention change first. The scatterplot showed a non-linear relationship (**Figure 5.4**). Thus, revisit intention change was transformed. The smallest value in the data set was identified first (-5.00), and the absolute value of the smallest value was added to each revisit intention change value to make them positive. Then the square root was applied. After the transformation, the relationship became linear (**Figure 5.5**). A Durbin-Watson test showed that there was independence of residuals by a statistic of 1.98. A visual inspection of a plot of standardized residuals versus standardized predicted values showed that there was homoscedasticity. Residuals were normally distributed as assessed by visual inspection of a normal probability plot.

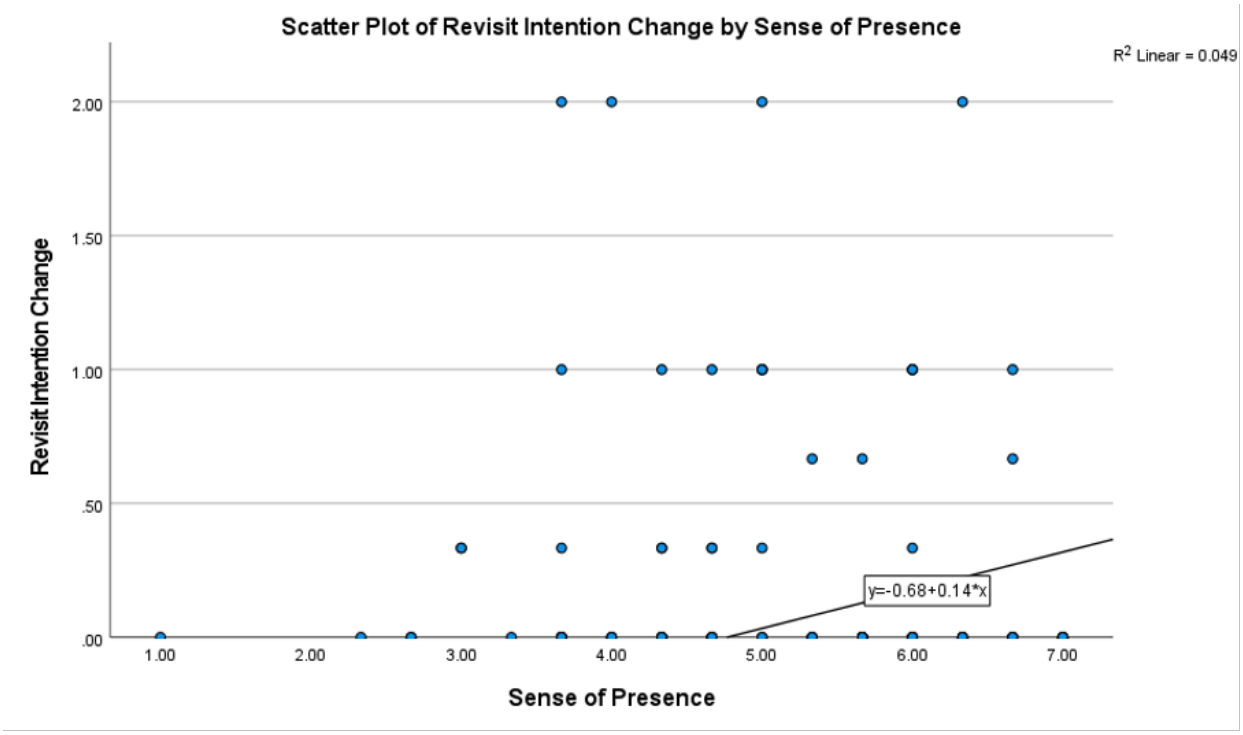

Figure 5.4 Scatter plot of revisit intention change by sense of presence.

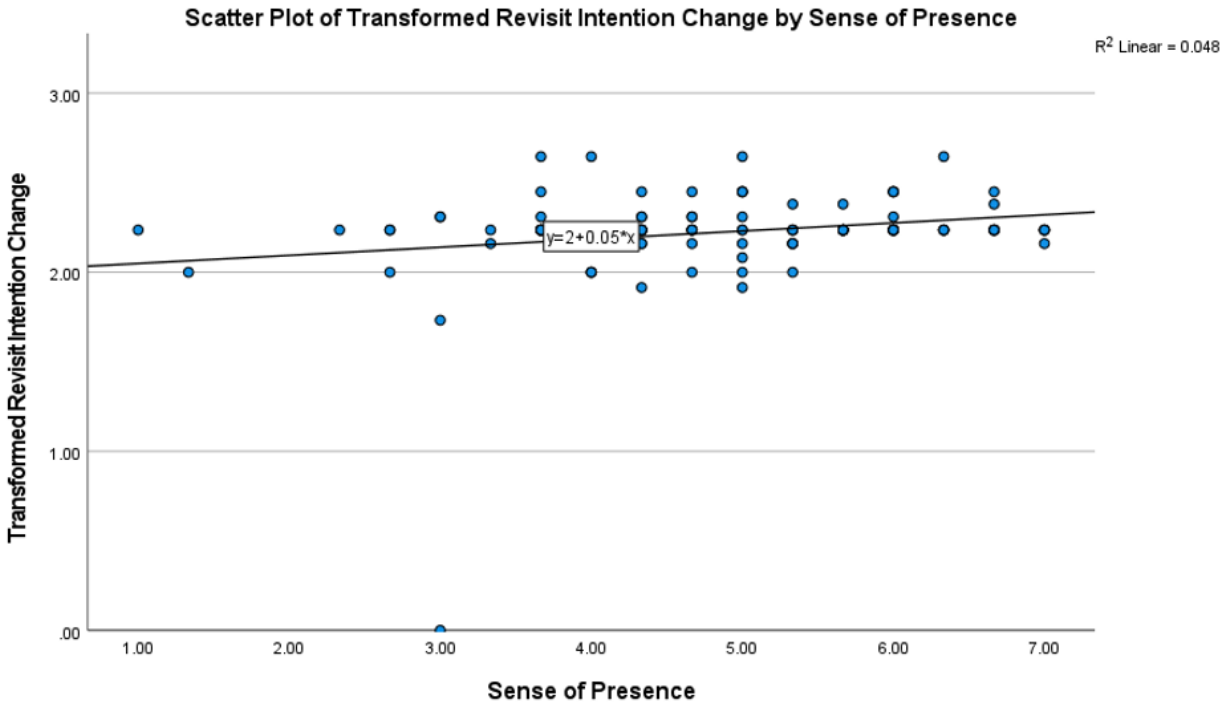

Figure 5.5 Scatter plot of transformed revisit intention change by sense of presence.

The assumption checks were performed on the relationship between the sense of presence and personal nostalgia change. The scatterplot showed a non-linear relationship (**Figure 5.6**). Thus, personal nostalgia change was transformed using the same method applied to revisit intention change. After the transformation, the relationship became linear (**Figure 5.7**). A Durbin-Watson test showed that there was independence of residuals by a statistic of 1.86. A visual inspection of a plot of standardized residuals versus standardized predicted values showed that there was homoscedasticity. Residuals were normally distributed as assessed by visual inspection of a normal probability plot.

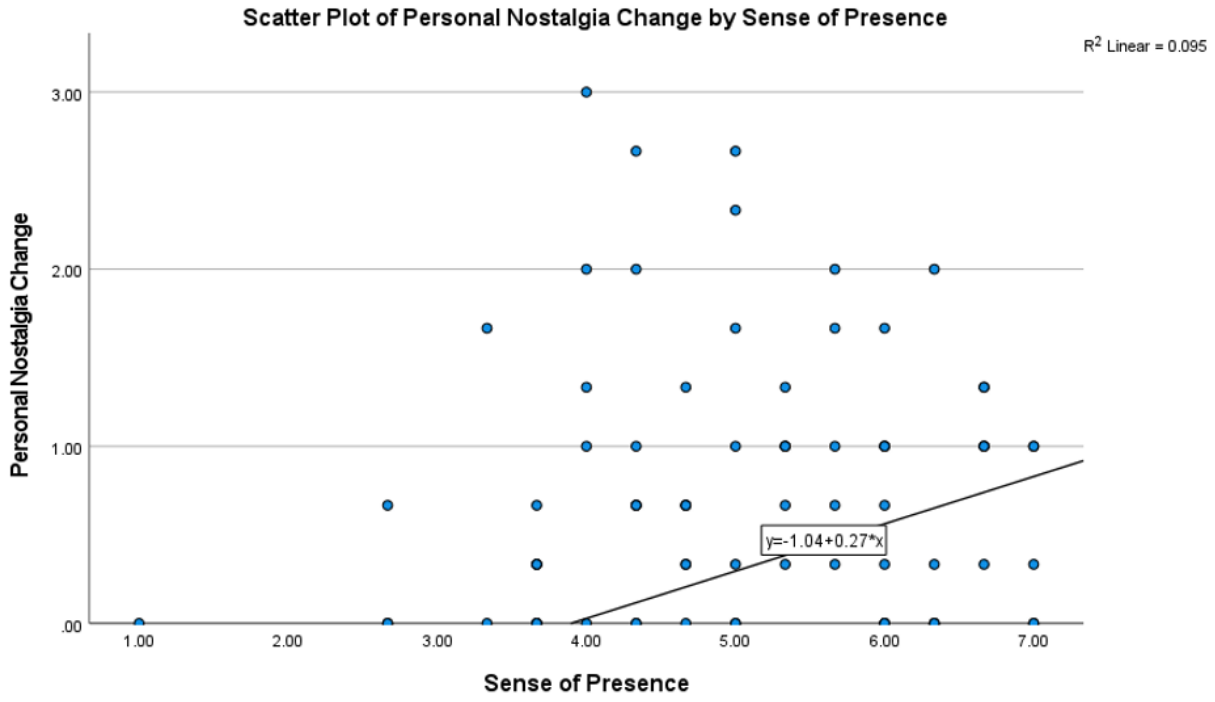

Figure 5.6 Scatter plot of personal nostalgia change by sense of presence.

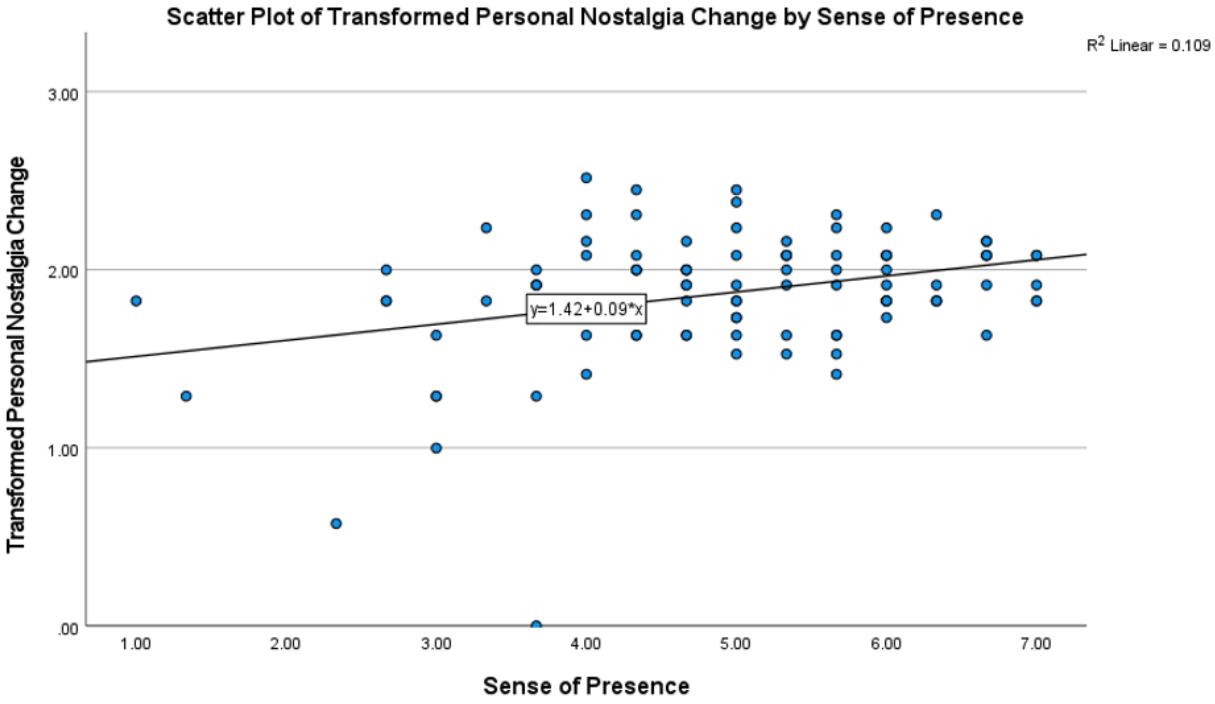

Figure 5.7 Scatter plot of transformed personal nostalgia change by sense of presence.

The assumption checks were performed on the relationship between personal nostalgia change and revisit intention change. The scatterplot showed a non-linear relationship between personal nostalgia change and revisit intention change (**Figure 5.8**), but a linear relationship between transformed personal nostalgia change and transformed revisit intention change (**Figure 5.9**). Thus, transformed variables were sued. A Durbin-Watson test showed that there was independence of residuals by a statistic of 1.94. A visual inspection of a plot of standardized residuals versus standardized predicted values showed that there was homoscedasticity. Residuals were normally distributed as assessed by visual inspection of a normal probability plot. Thus, the PROCESS was deemed appropriate for the analysis.

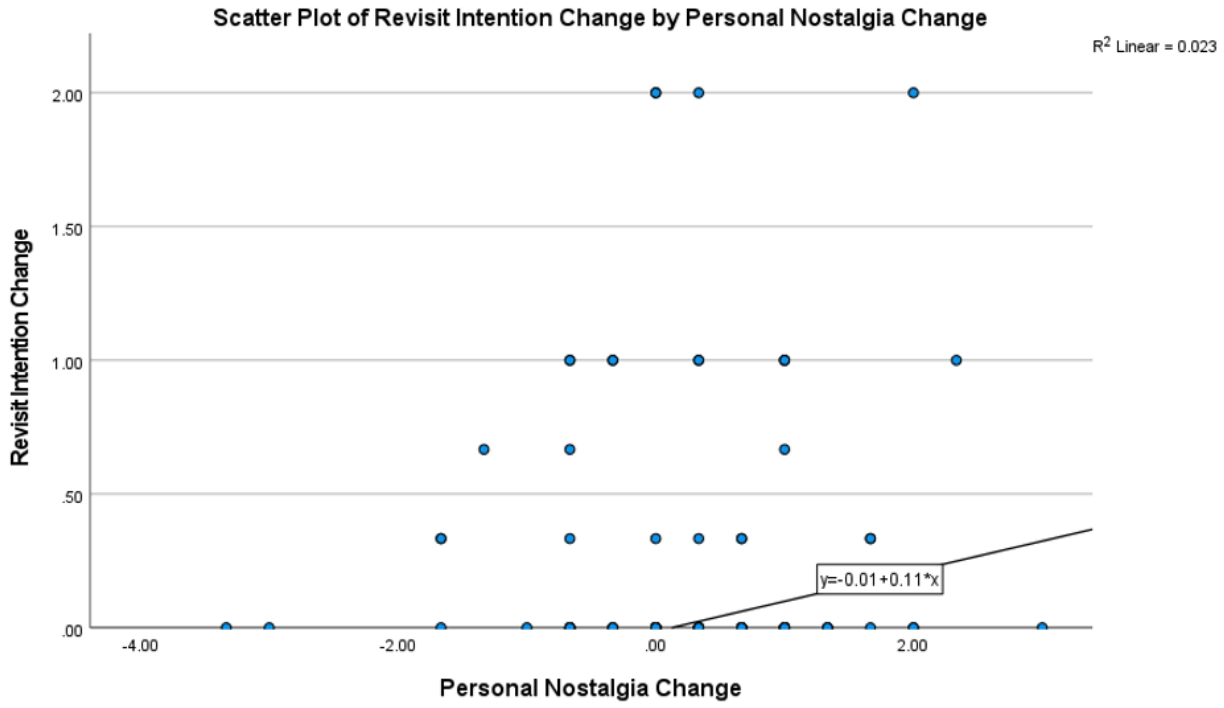

Figure 5.8 Scatter plot of revisit intention change by personal nostalgia change.

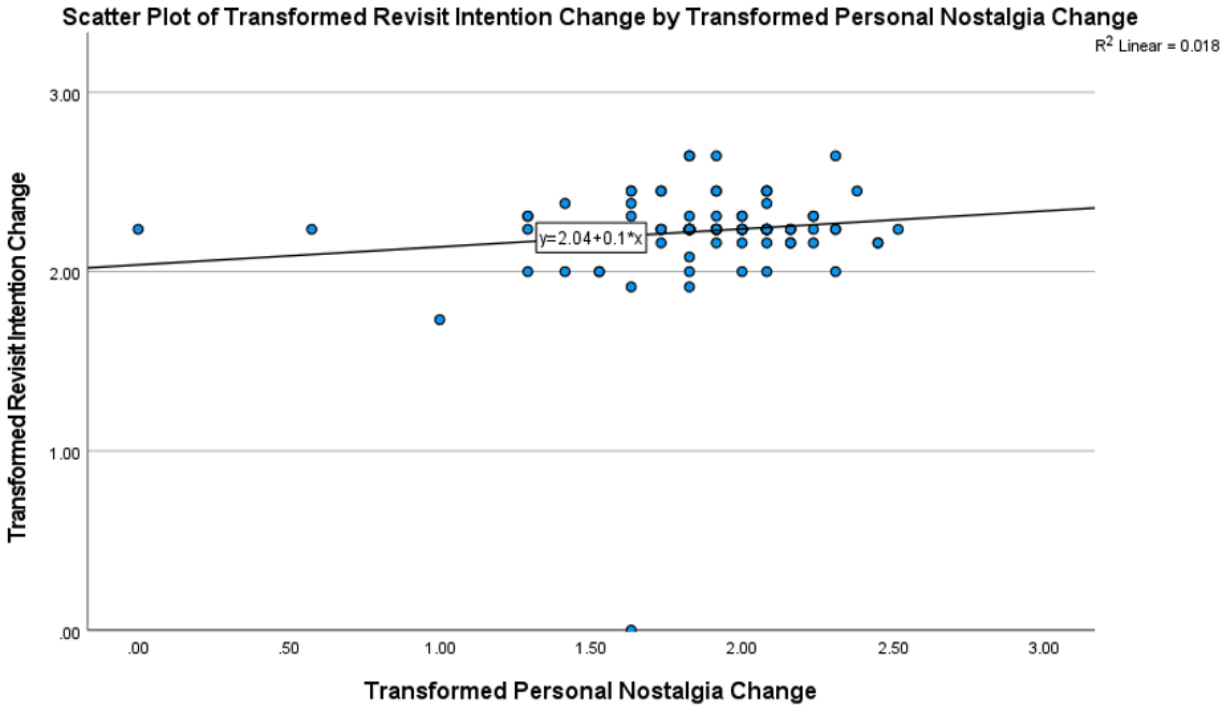

Figure 5.9 Scatter plot of transformed revisit intention change by transformed personal nostalgia change.

The results showed that there was no significant indirect effect (b = .051, t = .675, p = .501) but a significant direct effect of the sense of presence on transformed revisit intention change in presence of a mediator at the .1 level (b = .041, t = 1.95, p = .053). The direct effect of the sense of presence on transformed personal nostalgia change was significant (b = .091, t = 3.58, p < .001). This indicates that personal nostalgia change did not mediate the relationship between the sense of presence and revisit intention change. And, despite the weak evidence, the sense of presence positively influenced revisit intention change in presence of as well as in absence of a mediator. Therefore, hypothesis 3 was supported only by the post-stimulus variables. See **Table 5.7** for the details of the mediating effects of personal nostalgia change.

Table 5.7 Mediating effects of transformed personal nostalgia change between sense of presence and transformed revisit intention change

Relationship	Total Effect	Direct Effect	Indirect Effect	Confidential Interval		*t*
				Lower	Upper	
Sense of Presence -> Transformed Personal Nostalgia Change -> Transformed Revisit Intention Change	.045*	.041	.005	-.003	.016	.675

Note: *** p < .001, ** p < .01, * p < .05

The same analysis was conducted controlling novelty-seeking and place attachment. The result showed that there was no significant indirect effect (b = .074, t = .838, p = .405) and no significant direct effect (b = .033, t = 1.36, p = .177) of the sense of presence on transformed revisit intention change in presence of a mediator. The direct effect of the sense of presence on transformed personal nostalgia change was significant (b = .110, t = 4.15, p < .001). These results are in line with the results without control variables in that personal nostalgia change did not mediate the relationship between the sense of presence and revisit intention change. Meanwhile, the sense of presence positively influenced revisit intention change in absence of a mediator only at the .1 level (p = .067) in this analysis. See **Table 5.8** for the details of the mediating effects of personal nostalgia change with control variables.

Table 5.8 Mediating effects of personal nostalgia change between sense of presence and revisit intention change controlling novelty-seeking and place attachment

Relationship	Total Effect	Direct Effect	Indirect Effect	Confidential Interval		*t*
				Lower	Upper	
Sense of Presence -> Transformed Personal Nostalgia Change -> Transformed Revisit Intention Change	.041	.033	.008	-.004	.024	.838

Note: *** p < .001, ** p < .01, * p < .05

The moderating effects of temporal distance and destination satisfaction were examined using Hayes's PROCESS macro. Model 1 in Hayes's PROCESS macro was conducted using pooled personal nostalgia (combining the LP group and HP group). The assumptions for the regression analysis except for linearity were checked before the test.

Hypothesis 4 proposed that temporal distance will moderate the relationship between the sense of presence and personal nostalgia. As temporal distance to the most recent visit increases, the positive relationship between the sense of presence and personal nostalgia will be stronger. A Durbin-Watson test showed that there was independence of residuals by a statistic of 2.14. A visual inspection of a plot of standardized residuals versus standardized predicted values showed that there was homoscedasticity. The normality of residuals was acceptable as assessed by visual inspection of a normal probability plot. Thus, the PROCESS was deemed appropriate. The results showed that there was no significant interaction between the sense of presence and temporal distance (b = .000, F = .293, p = .589). This indicates that temporal distance did not moderate the relationship between the sense of presence and post-stimulus personal nostalgia. Therefore, hypothesis 4 was not supported.

The same analysis was conducted for the moderating effects of temporal distance on the relationship between the sense of presence and personal nostalgia change. The assumptions for the relationship between the sense of presence and temporal distance were checked above. The results showed that there was no significant interaction between the sense of presence and temporal distance (b = .005, F = 1.79, p = .184). This indicates that temporal distance did not moderate the relationship between the sense of presence and personal nostalgia change, which aligned with the results of the moderating effects of temporal distance on the relationship between the sense of presence and post-stimulus personal nostalgia.

Hypothesis 5 proposed that destination satisfaction will moderate the relationship between the sense of presence and personal nostalgia. As the level of destination satisfaction increases, the positive relationship between the sense of presence and personal nostalgia will be stronger. A Durbin-Watson test showed that there was independence of residuals by a statistic of 2.40. A visual inspection of a plot of standardized residuals versus standardized predicted values showed that there was homoscedasticity. Residuals were normally distributed as assessed by visual inspection of a normal probability plot. Thus, the PROCESS was deemed appropriate. The result showed that there was no significant interaction between the sense of presence and destination satisfaction (b = -.105, F = 2.40, p = .124). This indicates that destination satisfaction did not moderate the relationship between the sense of presence and post-stimulus personal nostalgia. Therefore, hypothesis 5 was not supported.

The same analysis was conducted for the moderating effects of destination satisfaction on the relationship between the sense of presence and personal nostalgia change. The assumptions for the relationship between the sense of presence and destination satisfaction were checked above. The results showed that there was no significant interaction between the sense of presence and destination satisfaction (b = -.083, F = 1.55, p = .216). This indicates that destination satisfaction did not moderate the relationship between the sense of presence and personal nostalgia change, which aligned with the results of the moderating effects of destination satisfaction on the relationship between the sense of presence and post-stimulus personal nostalgia.

Additional analyses

Since no effects of the sense of presence on personal nostalgia and revisit intention were detected from the hypotheses testing, additional analyses were performed to examine the effects of a VR destination experience on personal nostalgia and revisit intention by combining the two between-subject groups using a paired-samples t-test. A paired-samples t-test is used to examine the mean difference between paired measures of the same group. Before the test, the normality assumption for the paired-samples t-test was checked (Chen et al., 2022).

In terms of the effects of a VR destination experience on personal nostalgia, a Kolmogorov-Smirnov test revealed that the data was not normally distributed (Pre: $p < .001$, Post: $p < .001$). A paired-samples t-test was performed, even though the normality assumption was violated as a t-test is robust to violations of normality. A paired-samples t-test showed that there was a statistically significant difference between the within-subject personal nostalgia groups ($t(106) = -2.47$, $p = .015$, $d = 1.10$). This suggests that personal nostalgia was significantly increased after a VR destination experience regardless of the level of the sense of presence.

The same analysis was performed on each between-subject group to investigate the difference in the effects of a VR destination experience between the groups. The analysis was conducted on the LP group first. A Shapiro-Wilk test revealed that the data was not normally distributed (Pre: $p = .003$, Post: $p < .001$). A paired-samples t-test showed that there was a statistically significant difference between the two within-subject personal nostalgia groups ($t(46) = -2.18$, $p = .034$, $d = 1.03$). This suggests that personal nostalgia in the LP group significantly increased after a VR destination experience. For the HP group, a Shapiro-Wilk test revealed that the data was not normally distributed (Pre: $p = .001$, Post: $p < .001$). A paired-

samples t-test showed that there was no statistically significant difference between the within-subject personal nostalgia groups ($t(59) = -1.42$, $p = .162$, $d = 1.15$). This suggests that personal nostalgia in the HP group did not significantly increase after a VR destination experience.

For the effects of a VR destination experience on revisit intention, a Kolmogorov-Smirnov test revealed that the data was not normally distributed (Pre: $p < .001$, Post: $p < .001$). A paired-samples t-test showed that there was no statistically significant difference between the within-subject revisit intention groups ($t(106) = -.198$, $p = .844$, $d = .814$). The result remained the same after controlling novelty-seeking and place attachment with a one-way repeated-measures ANCOVA ($F = .063$, $p = .802$, partial $\eta^2 = .001$). This suggests that revisit intention was not significantly increased after a VR destination experience.

The same analysis was performed on each between-subject group. The analysis was conducted on the LP group first. A Shapiro-Wilk test revealed that the data was not normally distributed (Pre: $p < .001$, Post: $p < .001$). A paired-samples t-test showed that there was no statistically significant change in revisit intention ($t(46) = -.898$, $p = .374$, $d = .650$). The result remained the same after controlling novelty-seeking and place attachment with a one-way repeated-measures ANCOVA ($F = .174$, $p = .679$, partial $\eta^2 = .004$). This suggests that revisit intention in the LP group did not significantly increase after a VR destination experience. The same analysis was performed for the HP group. A Shapiro-Wilk test revealed that the data was not normally distributed (Pre: $p < .001$, Post: $p < .001$). A paired-samples t-test showed that there was no statistically significant change in revisit intention ($t(59) = .326$, $p = .746$, $d = .925$). The result remained the same after controlling novelty-seeking and place attachment with a one-way repeated-measures ANCOVA ($F = .003$, $p = .960$, partial $\eta^2 = .000$). This suggests that revisit intention in the HP group did not significantly increase after a VR destination experience.

The hypotheses for the moderating effects of temporal distance and destination satisfaction on the relationship between the sense of presence and personal nostalgia were not supported. Meanwhile, additional analyses found that a VR destination experience significantly increased personal nostalgia. Hence, the effects of temporal distance and destination satisfaction on personal nostalgia change were examined using a two-way mixed ANOVA. Temporal distance and destination satisfaction were divided into two groups. Due to high skewness, temporal distance was divided into distant (N = 53) and recent (N = 54) groups using the median as a cutoff (1286.6 days). Destination satisfaction was divided into low (N = 59) and high (N = 48) groups using the mean value (6.02) as a cutoff. There are four assumptions for a two-way mixed ANOVA: 1) normality, 2) homogeneity of variances, and 3) homogeneity of covariances (Howell, 2010).

The effects of temporal distance were examined first. A Shapiro-Wilk test revealed that the data was not normally distributed in all groups except for the pre-stimulus nostalgia in the recent temporal distance group (Pre-Recent: $p < .001$, Post-Recent: $p < .001$, Pre-Distant: $p = .052$, Post-Distant: $p = .001$). An ANOVA test is regarded as fairly robust to deviations from normality. A Levene's test showed that there was homogeneity of variances ($F_{Pre} = 1.12$, $p = .292$, $F_{Post} = .771$, $p = .382$). A Box's test was performed to examine the assumption of homogeneity of covariances. The assumption of homogeneity of covariances is violated when the test result is significant ($p < .05$). The results showed that there was homogeneity of covariances ($F = .337$, $p = .799$). Based on the above, a two-way mixed ANOVA was deemed appropriate.

The results showed that there was no statistically significant interaction between personal nostalgia change and temporal distance at the .05 level, but it was significant at the .1 level ($F =$

2.84, $p = .095$, partial $\eta^2 = .026$). **Figure 5.10** indicated an interaction (Distant: 95% CI [5.50, 6.13], Recent: 95% CI [4.88, 5.52]). Further main effect examination showed that there was a statistically significant difference between pre- and post-stimulus personal nostalgia in the distant group ($F = 6.28$, $p = .014$, partial $\eta^2 = .056$). Thus, it could be suggested that personal nostalgia increased after a VR destination experience more for those whose last visit to NYC was more distant. The main effect of group showed that there was a statistically significant difference in mean personal nostalgia between the two temporal distance groups ($F = 7.28$, $p = .008$, partial $\eta^2 = .065$), meaning that personal nostalgia of those whose last visit to NYC was more distant was lower than whose last visit was more recent.

Figure 5.10 Interaction effects between personal nostalgia change and temporal distance.

In terms of the effects of destination satisfaction, a Shapiro-Wilk test revealed that the data was not normally distributed except for pre-stimulus personal nostalgia in the low satisfaction group (Pre-Low: $p = .024$, Post-Low: $p < .001$, Pre-High: $p < .001$, Post-High: $p < .001$). A Levene's test showed that the homogeneity of variances assumption was met ($F_{Pre} = .304$, $p = .582$, $F_{Post} = .052$, $p = .820$). A Box's test results showed that there was homogeneity of covariances ($F = .074$, $p = .974$). Based on the above, a two-way mixed ANOVA was performed. The results showed that there was no statistically significant interaction between personal nostalgia change and destination satisfaction ($F = .475$, $p = .492$, partial $\eta^2 = .004$). Further main effect examination showed that there was no statistically significant difference between pre- and post-stimulus personal nostalgia in any groups ($F = 1.20$, $p = .163$, partial $\eta^2 = .019$). Meanwhile, the main effect of the group showed that there was a statistically significant difference in mean personal nostalgia between the two destination satisfaction groups ($F = 10.9$, $p = .001$, partial $\eta^2 = .095$). Specifically, personal nostalgia of those who had a higher destination satisfaction was higher than those who had a lower destination satisfaction (**Figure 5.11**).

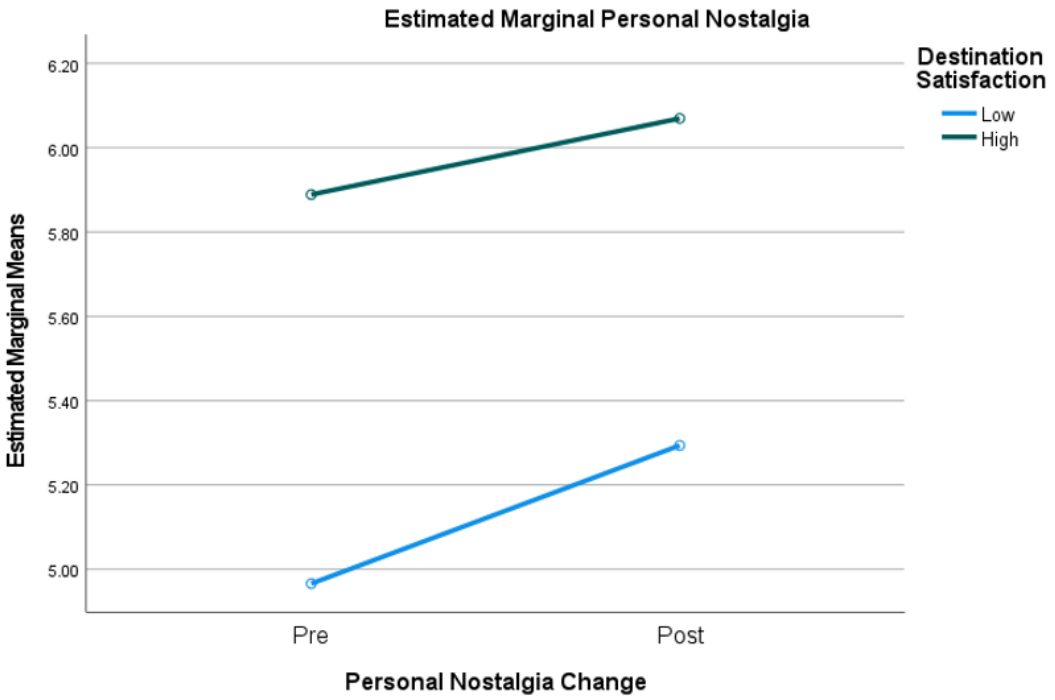

Figure 5.11 Interaction effects between personal nostalgia change and destination satisfaction.

Phase 2: Qualitative Survey

Participants profile

A total of 94 responses was collected in Phase 2. Participants in Phase 2 were recruited from participants in Phase 1. The response rate of Phase 2 was 79.0%. Among them, 43 and 51 participants were in the low and high sense of presence groups, respectively. Participants were asked about their demographic information at the end of the post-stimulus survey including gender, household income, education level, race, and age. The average age of the participants was 34.7 (*SD* = 14.3), ranging from 18 to 69 years old. Over half of the participants were female (71.3%) and white (64.9%). The household income and education level were relatively evenly

distributed. This shows that the distribution of demographics is similar to Phase 1. See **Table 5.9** for the details of participants profile of Phase 2.

Table 5.9 Participants profile of Phase 2

Variables	Categories	Frequency	Percentage
Presentation Mode	Tablet PC	43	45.3
	VR HMD	51	54.7
Gender	Male	27	28.7
	Female	67	71.3
	Other	0	0
	Decline to answer	0	0
Income	Less than $20,000	7	7.4
	$20,000 to $34,999	9	9.6
	$40,000 to $59,999	8	8.5
	$60,000 to $79,999	15	16.0
	$80,000 to $99,999	5	5.3
	$100,000 to $119,999	12	12.8
	$120,000 to $149,999	17	18.1
	$150,000 to $199,999	9	9.6
	more than $200,000	5	5.3
	Decline to answer	7	7.4
Education	Less than high school	0	0
	High school graduate	11	11.7
	Some college but no degree	16	17.0
	College degree	5	5.3
	Bachelor's degree	18	19.1
	Master's degree	31	33.0
	Doctorate/Ph.D. degree	12	12.8
	Professional degree	1	1.1
	Other	0	0
	Decline to answer	0	0
Race	Black or African American	1	1.1
	Native American/ Alaska Native	1	1.1
	Native Hawaiian/ Pacific Islander	0	0
	Asian	23	24.5
	White/ European American	61	64.9
	Other	8	8.6
	Decline to answer	0	0
Age	M: 34.7, SD: 14.3, MD: 31.0, Min: 18, Max: 69		

Qualitative findings

Two questions directly related to research hypotheses were used for data analyses. The first question asked if participants felt nostalgia of their past visit to NYC after the virtual tour at the lab and why. To construct the codebook, four categories were developed first based on three research variables influencing personal nostalgia (i.e., sense of presence, temporal distance, destination experience): sense of presence, temporal distance, positive experience, and negative experience. Specifically, if participants discussed realistic experiences of the virtual tour, it was coded as sense of presence. If participants talked about when their last visit was, it was coded as temporal distance. If participants discussed the quality of past destination experiences, it was coded as either positive or negative experience. In addition, three categories were added during the content analysis process: places shown, no attachment, and different experiences. If participants discussed that places shown in the virtual tour induced nostalgic feelings, it was coded as places shown. If participants talked about how much they were involved in destination during their visit and how much the lack of involvement influenced their disconnection to NYC, it was coded as no attachment. If participants talked about the difference between their NYC experience and the virtual tour experience, it was coded as different experience.

The second question asked if participants' revisit intention to NYC changed after experiencing the virtual tour at the lab and why. Two categories were developed first according to proposed research variables (i.e., personal nostalgia and sense of presence). Sense of presence was coded in the same way as the first question. If participants mentioned that nostalgia increased their revisit intention, it was coded as nostalgia. Besides, six categories were added during the coding process: new places, high revisit intention, familiarity, travel constraints, places shown, and negative experience. If participants talked about their desire to visit places

they have not visited, it was coded as new places. If participants mentioned that they already had high revisit intention, it was coded as high revisit intention. If participants discussed that they do not want to revisit NYC because they visited most places in NYC, it was coded as novelty. If participants talked about money, physical, and/or time constraints to revisit NYC, it was coded as travel constraints. Places shown and negative experience were coded in the same way as the first question. Responses that did not provide details were coded as not specified. The coded data was computed and analyzed. The results of the content analysis are presented in **Table 5.10**.

Table 5.10 Results of content analysis of the qualitative data

Questions	Groups	Categories	Frequency	Percentage
After watching the virtual NYC tour video, did you feel nostalgic about your past visit(s) to NYC (i.e., missing your past visit(s) to NYC)? If yes, how and why? If not, why not?	Yes		78	83.0
		Temporal Distance	2	2.6
		Positive Experience	24	30.8
		Negative Experience	2	2.6
		Places Shown	28	35.9
		Sense of Presence	3	3.8
		Not Specified	19	24.4
	No		16	17.0
		Temporal Distance	3	18.8
		Negative Experience	5	31.3
		No Attachment	3	18.8
		Different Experience	2	12.5
		Other	2	12.5
		Not Specified	1	6.3
After watching the virtual NYC tour video, did your intention to revisit NYC change? If yes, how and why? If not, why?	Yes		28	29.8
		Nostalgia	6	21.4
		New Places	10	35.7
		Sense of Presence	2	7.1
		Not Specified	10	35.7
	No		66	70.2
		High Revisit Intention	41	62.1
		Novelty	7	10.6
		Travel Constraints	6	9.1
		Places Shown	3	4.5
		Negative Experience	3	4.5
		Other	1	1.5
		Not Specified	5	7.6

The first question was asked to shed light on the statistical results for hypothesis 1. Phase 1 found that there were no statistically significant effects of the sense of presence on personal nostalgia. In Phase 2, 83% of participants said that they felt nostalgia. Among them, only about 4% of participants mentioned that the realistic VR experience made them feel nostalgia. This provides further support for the results of hypothesis 1 in Phase 1. Meanwhile, among those who felt nostalgia, about 36% of participants elaborated that it was because the video showed places they had visited. One participant said, "*Yes! […] I have been to several of the places listed in the video so it was a nice way for me to remember my past trips, and both the places I have already visited as well as the ones I haven't inspired me to want to go back* (Female, 37, LP)." This implies that personal nostalgia increased after experiencing the virtual tour, and it was because of sensory cues about places such as visual and/or auditory information about places regardless of sense of presence. Phase 1 showed statistically marginal effects of the sense of presence on personal nostalgia (i.e., between-subject factor). However, personal nostalgia statistically significantly increased after a VR destination experience either with a low sense of presence or regardless of the sense of presence (i.e., within-subject factor), suggesting that personal nostalgia might have been increased by factors other than sense of presence. Therefore, Phase 2 suggested that sensory cues about places might have evoked personal nostalgia rather than a sense of presence.

The second question was asked to shed light on the statistical results for hypothesis 2. Phase 1 showed no statistically significant effects of the sense of presence on revisit intention. In Phase 2, about 70% of participants said that their revisit intention to NYC did not change after the virtual tour, and there was no mention of the realistic experience of the virtual tour. This supported the results of hypothesis 2 in Phase 1. Meanwhile, among those whose revisit intention

did not change, about 62% of participants mentioned that it was mostly because they already wanted to revisit NYC in the future. One participant said, "*No. I had planned to go again someday (probably years from now), and the video didn't change that* (Female, 39, LP)." From above, it could be assumed that revisit intention did not change because of the already high revisit intention. The descriptive statistics in Phase 1 showed that mean values of revisit intention were over 6 (very high and positive value) in all groups. Hence, both Phase 1 and Phase 2 suggest that revisit intention did not change probably because of already high revisit intention.

To shed light on the statistical result for hypothesis 3, the second question was examined. Phase 1 showed that personal nostalgia fully mediated the relationship between the sense of presence and revisit intention. In Phase 2, among the participants whose revisit intention changed after the virtual tour, about 21% of participants said their revisit intention increased because the video reminded them of their past visit to NYC. For example, "*Yes, it made me want to visit sooner and hopefully prioritize that in the next couple years because it brought back very good memories* (Female, 21, LP)." This finding suggested that personal nostalgia positively influenced revisit intention when revisit intention changed. However, from the above, it was revealed that a sense of presence did not increase personal nostalgia. Thus, Phase 2 supported the positive relationship between personal nostalgia and revisit intention only.

To provide more insights into the statistical result for hypotheses 4 and 5, the first question was examined. Phase 1 found no statistically significant moderating effects of temporal distance on the relationship between the sense of presence and personal nostalgia. In Phase 2, there were few responses providing insights into the moderating role of temporal distance on the relationship between the sense of presence and personal nostalgia. Meanwhile, additional analyses in Phase 1 revealed that personal nostalgia of those whose last visit was more recent

increased less than those whose last visit was more distant. Phase 2 found that about 19% of participants who did not feel nostalgia mentioned that their last visit was very recent. For example, "*I did not specifically feel nostalgic because I only went very recently and I'm sure I will go again since it is NYC!* (Female, 21, LP)." This seems to imply that personal nostalgia change was subtle for those whose last visit was more recent. Therefore, this provides additional support for the additional findings from Phase 1.

In terms of destination satisfaction, Phase 1 found no statistically significant moderating effects of destination satisfaction on the relationship between the sense of presence and personal nostalgia. In Phase 2, there were few responses providing insights into the moderating role of destination satisfaction on the relationship between the sense of presence and personal nostalgia. Meanwhile, additional analyses in Phase 1 showed that mean personal nostalgia was higher in the high destination satisfaction group than the low destination satisfaction group. This indicates that personal nostalgia was more about a pleasant past experience. In Phase 2, among those who felt nostalgia of their past visit to NYC, about 31% of participants mentioned that it was because they had a positive experience in NYC. One participant said, "*Yes! I think I was feeling nostalgic because I had a such a good trip, and the video really teleported me back to those memories* (Male, 26, LP)." Among participants who did not feel nostalgia, about 31% of them mentioned that it was because of a negative experience in NYC. For example, "*No, I did not like NYC when I visited* (Male, 39, LP)." Therefore, both Phase 1 and Phase 2 imply a positive relationship between destination satisfaction and personal nostalgia.

CHAPTER 6: CONCLUSIONS AND IMPLICATIONS

This chapter concludes and discusses the research findings. The research findings are summarized first, followed by theoretical and practical implications of the results. The last part of the chapter discusses the limitations of the research and recommendations for future research.

Review of the Findings

Based on the SOR framework, this research investigated the effects of a sense of presence, induced by a VR destination experience, on personal nostalgia and revisit intention. In addition, this research examined the moderating effects of temporal distance and destination satisfaction on the relationship between the sense of presence and personal nostalgia. Five hypotheses developed from the literature review were tested. The statistical results from Phase 1 supported only one hypothesis. Specifically, the results supported the mediating effects of personal nostalgia on the relationship between the sense of presence and revisit intention. **Table 6.1** summarized the hypotheses testing results. Additionally, Phase 1 found that personal nostalgia significantly increased after a VR destination experience either with a low sense of presence or regardless of the level of the sense of presence. Temporal distance moderated the relationship between a VR destination experience and personal nostalgia at the .1 significance level.

Table 6.1 Hypotheses testing summary

Hypotheses	Results
H1: A high (vs. low) sense of presence, facilitated by a VR experience of a previously visited destination, will increase personal nostalgia.	Not Supported
H2: A high (vs. low) sense of presence, facilitated by a VR experience of a previously visited destination, will increase revisit intention.	Not Supported
H3: Personal nostalgia will mediate the relationship between sense of presence and revisit intention.	Supported
H4: Temporal distance will moderate the relationship between sense of presence and personal nostalgia. As temporal distance to the most recent visit increases, the positive relationship between sense of presence and personal nostalgia will be stronger.	Not Supported
H5: Destination satisfaction will moderate the relationship between sense of presence and personal nostalgia. As the level of destination satisfaction increases, the positive relationship between sense of presence and personal nostalgia will be stronger.	Not Supported

The findings from Phase 2 mostly supported the statistical results from Phase 1. Phase 2 also revealed the marginal effects of the sense of presence on personal nostalgia and revisit intention. Meanwhile, Phase 2 showed that personal nostalgia increased after a VR destination experience for most participants. In conjunction with the additional findings in Phase 1, Phase 2 suggested that sensory cues about previously visited places from a VR destination experience may have evoked personal nostalgia rather than the sense of presence. In terms of revisit intention, the descriptive statistics in Phase 1 and findings from Phase 2 suggested that revisit intention did not change after a VR destination experience because participants already had a very high revisit intention. Phase 2 could not provide strong evidence for the mediating effects of personal nostalgia and the moderating effects of temporal distance and destination satisfaction. Yet, Phase 2 supported the positive relationship between personal nostalgia and revisit intention as Phase 1 showed. Also, Phase 2 supported the results from the additional analyses in Phase 1

about the moderating roles of temporal distance on the relationship between a VR destination experience and personal nostalgia and the positive relationship between destination satisfaction and personal nostalgia.

Theoretical Implications

Despite the importance of repeat visitors, how to induce repeat visitation has been under-researched. To fill the research gap, this research investigated the effects of a sense of presence, facilitated by a VR destination experience, on personal nostalgia and revisit intention. This research was informed by the SOR framework. The SOR framework explains how people process and react to external stimuli (Mehrabian & Russel, 1974). A sense of presence, personal nostalgia, and revisit intention were examined as a stimulus, organism, and response, respectively. Although the SOR framework is based on causal relationships, extant research has mostly focused on correlations. Hence, this research adopted an experimental design to examine causal relationships among the interested variables. Specifically, this research employed a mixed experimental design to increase statistical power. In addition, by examining the effects of a sense of presence induced by a VR destination experience as a stimulus, this research contributed to knowledge expansion of the SOR framework to the virtual environment along with past studies (e.g., Kim et al., 2020; Rajaguru, 2014).

This research proposed that a sense of presence induced by a VR destination experience will increase personal nostalgia and revisit intention. The level of the sense of presence was manipulated using different presentation modes based on Kim and Biocca (1997). Kim and Biocca argued that a sense of presence involves detachment from the surrounding physical environment (i.e., departure) and a sense of being in the mediated environment (i.e., arrival).

Thus, this research assumed that the use of a VR HMD will result in a stronger sense of presence compared to a tablet PC. As expected, this research found that a VR HMD generated a significantly higher sense of presence than a tablet PC, which aligns with past studies showing that a VR HMD generates a higher sense of presence than other presentation modes (e.g., Ying et al., 2021). This research along with past studies supported Kim and Biocca's notion of the sense of presence.

This research assumed that a sense of presence induced by a VR destination experience will increase revisit intention with personal nostalgia as a mediator. Past studies have shown that a sense of presence increases visit intention (e.g., Tussyadiah et al., 2018; Ying et al., 2021), suggesting VR as a powerful destination marketing tool. However, existing studies have not made a distinction between past visitors and potential visitors, even though there could be differences in information processing between these groups. Therefore, it remains unclear whether a sense of presence increases revisit intention. From the hypothesis testing, this research found no significant effects of the sense of presence on revisit intention. However, the descriptive statistics in Phase 1 and Phase 2 results showed that revisit intention did not change because participants' revisit intention to NYC was already high. This makes it difficult to confidently conclude the effects of the sense of presence on revisit intention because the results could be different when the range of revisit intention varies. Shin and Jeong (2022) demonstrated that virtual trip immersion was positively associated with revisit intention. Likewise, this research found a positive correlation between the sense of presence and revisit intention, but there was no evidence of causal relationships. This suggested that factors other than the sense of presence may be more influential on revisit intention. However, the result remained the same with control variables (i.e., novelty-seeking and place attachment). Perhaps there is no single

factor that significantly increases revisit intention. In Phase 2, about 21% of participants whose revisit intention increased indicated that feeling nostalgia of past visits increased their revisit intention. Since no effects of the sense of presence on personal nostalgia were found in this research, the sense of presence might have marginally increased revisit intention through personal nostalgia. Meanwhile, about 35% of them mentioned that seeing places they have not visited in the virtual tour motivated them to revisit, meaning that revisit intention could increase through the same mechanism as visit intention does for potential visitors. As stated above, past studies have shown that a sense of presence increases visit intention (e.g., Tussyadiah et al., 2018; Ying et al., 2021). This implies that there might be several mechanisms to increase revisit intention, which may have made it difficult to detect causal relationships between the sense of presence and revisit intention. Therefore, there were no effects of the sense of presence on revisit intention from this research. However, it needs more investigation with various factors and destinations. This unexpected finding is meaningful as it demonstrates the call for more experimental studies in tourism.

This study assumed that a sense of presence induced by a VR destination experience will increase personal nostalgia. Nostalgia is evoked by triggers (Sedikides et al., 2008). This research proposed a sense of presence as a nostalgia trigger because a past event is better retrieved when individuals are in a situation that closely resembles the past event (Kvavilashvilli & Mandler, 2004). Extant studies supported this notion. For example, Lin et al. (2020) revealed a positive association between VR effects and personal nostalgia. Shin and Jeong (2022) showed a positive association between virtual trip immersion and personal nostalgia. In line with these studies, this research discovered a significantly positive correlation between the sense of presence and personal nostalgia. However, the evidence from this research is not sufficient to

conclude a causal relationship between the sense of presence and personal nostalgia. This suggests that factors other than the sense of presence may be more influential on personal nostalgia or no single factor significantly increases personal nostalgia. Phase 1 further revealed that personal nostalgia increased after experiencing a VR destination experience, especially in the low sense of presence condition. This implies that the former explanation is more plausible. Phase 2 found that personal nostalgia increased for most participants by seeing places they visited in the virtual tour. This suggests that sensory cues might have played a role in personal nostalgia evocation rather than the sense of presence. While it was not by the sense of presence, this finding supports the notion that nostalgia is evoked by triggers. Particularly, sensory inputs are regarded as one of the main nostalgia triggers (Havlena & Holak, 1991; Sedikides et al., 2008; Wildschut et al., 2006). Plus, this research contributed to the knowledge expansion of nostalgia by providing a higher-order knowledge about the relationship between the sense of presence and personal nostalgia (Viglia & Dolnicar, 2020).

This research proposed that personal nostalgia will mediate the relationship between the sense of presence and revisit intention. Extant literature suggests that revisit intention is influenced by emotional aspects of past destination experiences (e.g., Assaker & Hallak, 2013; Rather et al., 2022). Personal nostalgia is both cognitive and emotional and about one's past experience (Cho et al., 2015; Stern, 1992; Wilson, 2005). This research, as expected, found that personal nostalgia mediated the relationship between the sense of presence and revisit intention. This finding demonstrates the important role of past destination experience in revisit intention as previous studies suggested above. This result is consistent with Shin and Jeong's (2022) study. This research further showed that personal nostalgia fully mediated the relationship, although the total effect of the sense of presence on revisit intention decreased with control variables. This

indicates that personal nostalgia is a powerful predictor of revisit intention. Scholars argued that nostalgia is a motivational construct (e.g., Holbrook, 1993; Sedikides & Wildschut, 2016). The positive relationship between personal nostalgia and revisit intention has been found in past studies (e.g., Hu & Xu, 2021; Jian et al., 2021). This mediating effect was not supported when embracing within-subject design. However, the result with within-subject design might have been influenced by already high revisit intention before the research stimulus, suggesting that this study should be replicated with a wide range of revisit intention. The hypothesis testing results and Phase 2 findings in this research were similar. This supports the notion that nostalgia is an essential tourist motivation (Dann, 1977) and thus nostalgia should be actively utilized in tourism marketing.

This research examined the moderating effects of temporal distance on the relationship between the sense of presence and personal nostalgia. Specifically, this research proposed that the effects of the sense of presence on personal nostalgia will be stronger when the temporal distance to a past destination experience is greater. Forgetting theories posit that human memories fade away over time (Baddeley, 1998; Thorndike, 1913), and older memories need more assistance from retrieval cues to retrieve (Tulving, 1974). However, this research showed no significant moderating effects of temporal distance on the relationship between the sense of presence and personal nostalgia. Meanwhile, further examination showed that temporal distance moderated the relationship between a VR destination experience and personal nostalgia. Personal nostalgia of those whose last visit was more recent increased less after a VR destination experience than those whose last visit was more distant. Plus, the average of pre- and post-stimulus personal nostalgia of those whose last visit was more recent was significantly higher than those whose last visit was more distant. From the above, this research assumed that sensory

cues about previously visited places, rather than the sense of presence, increased personal nostalgia. In this case, sensory cues may have served as memory retrieval cues. Thus, this result supports the notion of forgetting theories in the sense that older memories need more assistance from retrieval cues. Hwang and Hyun's (2013) study supports that this result would be the same when personal nostalgia is framed as an emotional construct. They conceptualize personal nostalgia as emotional responses and found that nostalgia triggers generated more positive emotional responses over time for past restaurant customers. As a result, this research along with Hwang and Hyun's study demonstrated that personal nostalgia is both cognitive (i.e., memory) and emotional and, its evocation is influenced by time, though it needs more investigations on why it was not the case for the relationship between the sense of presence and personal nostalgia.

These significant moderating effects of temporal distance provide insights into the further development of the SOR framework. The SOR framework evolved from a traditional input-output framework by recognizing the importance of an organism – the internal processes of an external stimulus - in the information process. The organism has been expanded from mere emotional responses to diverse psychological processes. This shows that human information processes are complex. This research suggested that the internal processes of an external stimulus could be influenced by various contextual factors as indicated by the moderating effects of temporal distance. Indeed, Bandura (1977) highlighted the importance of contextual factors (i.e., social, situational, and temporal circumstances) when studying human psychological processes and behaviors. For some psychological reactions, it may be necessary to consider those factors. For example, memories are susceptible to time based on forgetting theories. Nevertheless, the SOR framework has been applied without considering those factors. More

research applying the SOR framework with various contextual factors is therefore required so that it can evolve toward a more comprehensive framework.

This research proposed that destination satisfaction will moderate the relationship between the sense of presence and personal nostalgia. Specifically, it was assumed that the effects of the sense of presence on personal nostalgia would be greater when individuals had a more satisfied destination experience. This is because personal nostalgia occurs when a past event is perceived positively. However, this research found that there were no significant moderating effects of destination satisfaction on the relationship between the sense of presence and personal nostalgia. Further examination revealed that there were no moderating effects of destination satisfaction on the relationship between a VR destination experience and personal nostalgia as well. However, the moderating effects of destination satisfaction on the relationship between a VR destination experience and personal nostalgia may need further investigation. This research assumed that positive or negative past destination experiences will be better evoked by a nostalgia trigger. However, because destination satisfaction was skewed towards positive in this research, destination satisfaction was divided into low and high groups with a mean value (6.02) to balance the sample size. Due to this, personal nostalgia might have increased similarly and moderately in both destination satisfaction groups. This implies that the result could be different when destination satisfaction is divided with a neutral value (4.0). Meanwhile, it was found that the average of pre- and post-stimulus personal nostalgia of those who had a higher destination satisfaction was significantly higher than those who had a lower destination satisfaction. Phase 2 also supported this result. This indicates that destination satisfaction is positively related to personal nostalgia as suggested by Hu and Xu (2021). This supported the notion that nostalgia is mostly positive when it is generated by memories (Newman et al., 2020).

Practical Implications

This research has practical implications. This research studied how to induce repeat visitation in order to help destination marketers manage destination loyalty and found no significant effects of the sense of presence on revisit intention. The effects of the sense of presence on revisit intention need more investigations, but it was found that revisit intention did not change because of already high revisit intention. This demonstrates that it is important for destinations to provide visitors with a quality destination experience. Meanwhile, in Phase 2, it was found that seeing places participants have not visited in the virtual tour increased revisit intention in many cases in addition to feeling nostalgic of their past visit. This suggests that popular destinations such as NYC also need to keep developing and promoting new tourist attractions or events to attract past visitors to return. Based on this finding, destinations can include both popular and emerging tourist attractions in marketing campaigns when targeting past visitors because visitors are likely to visit popular and must-see attractions first. It could be more efficient to encourage visitors to use destinations' own smartphone applications or platforms to rate previously visited attractions so that destinations can have information about visitor experience and where they visited. In this way, destinations can better manage the quality of the destination experience as well as customize marketing campaigns for each past visitor.

As expected, this research found that personal nostalgia fully mediated the relationship between the sense of presence and revisit intention. This implies that personal nostalgia evocation may be inevitable for past visitors when processing information about a previously visited destination. This suggests that destination marketers would need to consider using different strategies for past visitors and potential visitors as information processing would be

different between the two visitor groups. For past visitors, personal nostalgia marketing – marketing campaigns evoking nostalgic feelings of past visit(s) - would be more effective. For example, destinations can present popular tourist attractions including phrases reminding them of their past visit in marketing campaigns. If destinations have information about where visitors visited, they can utilize the information to customize personal nostalgia marketing. Some destinations heavily rely on repeat visitors such as mature destinations and destinations where the selling points are specific attributes such as beach or ski resorts (Qu et al., 2021; Tjørve et al., 2018) would find this result especially informative.

Christou et al. (2018) argued that destination stakeholders understand the benefits of nostalgia in destination marketing but do not strategically utilize it. This could be due to a lack of clear guidance on how to effectively evoke nostalgia. Thus, this research investigated a sense of presence, induced by a VR experience of a previously visited destination, as a personal nostalgia trigger but found that there were no significant effects of the sense of presence. This means that VR HMDs would not be necessary for destination marketers for personal nostalgia marketing. This research further found that a VR presentation mode providing a lower sense of presence was more effective to increase personal nostalgia. Hence, destination marketers may need to consider using different marketing tools for past visitors and potential visitors. Specifically, because a VR presentation mode providing a high sense of presence is known to be effective for encouraging visit intention (Tussyadiah et al., 2018), destinations can implement marketing campaigns using a VR presentation mode with a low sense of presence (e.g., 360-degree videos on tablets and smartphones) when targeting past visitors, while using a VR presentation mode with a high sense of presence (e.g., VR HMDs) when targeting potential visitors. In this case, destinations can save marketing costs by using a VR presentation mode with a low sense of

presence. Meanwhile, further examination showed that there were the effects of a VR destination experience on personal nostalgia. It was assumed that sensory cues about previously visited places increased personal nostalgia rather than the sense of presence. Therefore, destination marketers can focus more on what content (e.g., what visual and/or auditory information) better represents an attraction rather than the immersiveness of the presentation mode when targeting past visitors. To do so, it would be beneficial to investigate how attractions or events are projected in visitor-generated content (e.g., travel vlogs on YouTube).

Past researchers argued that post-visit management for past visitors is crucial for destination loyalty because revisit intention fades away over time (Carlsen & Charters, 2007; Li et al., 2021). This research hence investigated the moderating roles of temporal distance in the relationship between the sense of presence and personal nostalgia. This research found no significant moderating effects of temporal distance on the relationship between the sense of presence and personal nostalgia but found significant moderating effects between a VR destination experience and personal nostalgia. Specifically, individuals whose last visit was more temporally distant were more influenced by a VR destination experience than those whose last visit was more recent. And those whose last visit was more recent already had high personal nostalgia. This suggests that personal nostalgia marketing would be especially effective for past visitors whose last visit was temporarily farther. This demonstrates the importance of post-visit management for past visitors. Destinations should keep reminding past visitors of their previous visit to encourage their return. Based on the finding, destination marketers could focus more on identifying who visited their destination in the far past and implement marketing campaigns targeting them. The best way may be to utilize destinations' own smartphone app or platform to

manage visitor data. For destinations where this is not an option, they can cooperate with airlines or local accommodations to share visitor information.

This research investigated the moderating effects of destination satisfaction on the relationship between the sense of presence and personal nostalgia to help destination marketers better implement personal nostalgia marketing. This research did not find significant moderating effects of destination satisfaction. Meanwhile, it was found that mean personal nostalgia was significantly higher for those who had a high destination satisfaction than those who had a low destination satisfaction. This suggests that it is important for destinations to provide visitors with a quality destination experience to reduce marketing costs pertaining to encouraging repeat visitation as past visitors with high personal nostalgia are more likely to come back according to the research finding. As suggested above, it would be beneficial to use destinations' own smartphone apps or platforms to keep track of the quality of the destination experience. Working with local attractions, airlines, or accommodations could also be an option to get visitor satisfaction information.

Research Limitations

This research is subject to several limitations. The target population of this research was the population in Champaign, IL, U.S. Thus, the sample may not be able to be generalized beyond the research population. However, it was not feasible to widen the target research population due to the nature of a lab experiment because it requires travel for participants. Future research can replicate this research by targeting various populations to confirm the generalizability of the research findings.

This research adopted a 2 (between-subject: high vs. low sense of presence) by 2 (within-subjects: personal nostalgia and revisit intention before vs. after the research stimulus) mixed experimental design. Although the mixed experimental design was conducted to increase statistical power, the absence of a control group (i.e., a group with no research stimulus) may have decreased confidence in the research conclusion. Including a control group was not feasible in this research because it was difficult to recruit a larger number of participants due to recruitment criteria and a small research population and more important to ensure enough sample size for each group. Thus, future research can replicate this research including a control group with a larger sample size to provide stronger statistical results.

This research involved both between-subject design and within-subject design. To prevent a demand characteristic bias which occurs when research participants guess the purpose of the research, this research ensured at least a 4-day interval between pre- and post-stimulus data collection based on feedback from a pre-test. The average interval was 7.26 days which is greater than the target interval. However, there might still have been an interaction between between-subject design and within-subject design due to other influential factors. And this may have decreased the internal validity of this research.

This research adopted a self-reported measure of temporal distance. The question asked the year and month of the participants' most recent visit to NYC. This is arguably an appropriate way of measuring temporal distance, yet it might have generated some measurement errors, especially when participants' last visit was temporally very far.

The interaction between destination satisfaction and a VR destination experience was analyzed by dividing destination satisfaction into a low and high group. However, it could have been better analyzed by dividing it into a negative and positive group because personal nostalgia

is influenced by the evaluation of past experiences (Hu & Xu, 2021). However, it was not possible to achieve this due to the highly skewed nature of the distribution. Thus, future research should examine the interaction between destination satisfaction and personal nostalgia triggers by dividing destination satisfaction into a negative and positive group with a balanced sample size.

This research involved two phases: a lab experiment and a qualitative survey. It was ensured to distribute the Phase 2 survey within 24 hours of Phase 1 participation so that data can be collected before participants' memory about the virtual tour experience fades away. The survey was distributed mostly within 6 hours, and participants were encouraged to answer the survey as soon as possible. However, there might still be a possibility that participants responded to the survey when their memory faded away, or their memory might have been distorted when responding to the survey.

This research adopted a virtual NYC tour as a research stimulus. NYC was chosen because it is one of the most visited cities in the U.S. (Dodd, 2021). However, the research findings could be different with different destinations, especially with less popular destinations. This research indeed found that participants' pre-stimulus revisit intention and destination satisfaction were high, which influenced the research findings. This could mean that the research findings may not be generalized beyond the NYC context. Therefore, future research could replicate this research with various destinations.

Recommendations for Future Research

There are several recommendations for future research. This research proposed that a sense of presence induced by a VR destination will increase personal nostalgia. The findings

suggested that sensory cues about places from a VR destination experience increased personal nostalgia rather than the sense of presence. However, it was unclear why there were no effects of the sense of presence. Understanding this is crucial, given the widespread use of VR in the tourism sector owing to its ability to provide a high sense of presence. Therefore, future research is encouraged to investigate this topic.

This research found that a VR destination experience with a low sense of presence significantly increased personal nostalgia, and there was no significant personal nostalgia increase after a VR destination experience with a high sense of presence. This means that a high sense of presence was less influential on personal nostalgia than a low sense of presence. Based on the finding, this research suggested that destination marketers do not have to use a VR HMD for personal nostalgia marketing, but it was not sure if any VR presentation modes except for HMD would be effective. Also, whether a VR presentation mode with a lower sense of presence, such as a 2-dimensional static image, is more influential on personal nostalgia warrants further investigations. Hence, future research is encouraged to examine the effects of nostalgia triggers on personal nostalgia with various presentation modes.

This research investigated personal nostalgia as a way of inducing repeat visitation. From the literature review, there are various types of nostalgia such as historical nostalgia. This research found no significant effects of the sense of presence on personal nostalgia, but it may not be the case for other types of nostalgia. Some studies examined the relationship between a VR destination experience and different types of nostalgia (e.g., Lin et al., 2020). However, the causal relationship between the variables remains unknown. Therefore, more experimental studies are called for nostalgia studies in tourism.

This research showed that destination satisfaction positively influenced personal nostalgia. This suggested that nostalgia about past destination experiences is more about positive emotion. However, nostalgia is a complex construct involving mixed emotions (Jarratte & Gammon, 2016; Newman et al., 2020). Nostalgia about past destination experiences could involve negative emotions. From this research, it was found that personal nostalgia of a low destination satisfaction group also increased after a VR destination experience, though it is not statistically significantly. However, it is not clear if it was positive or negative emotion that played a role in nostalgia increase. Hence, future research can investigate the role of negative emotions in nostalgia development and the role of negative emotion involved nostalgia in tourism.

This research found a positive relationship between personal nostalgia and revisit intention. Phase 2 supported this finding, but it revealed that revisit intention also increased by seeing places participants have not visited in the virtual tour for many participants. This suggests that revisit intention may also increase as the way in which visit intention increases, by perceiving a previously visited destination as a novel destination. Indeed, this research found that sensory cues about places participants have visited from a VR destination experience increased personal nostalgia. This could mean that personal nostalgia may not be evoked when seeing places individuals have not visited, even though the places are located within the destination they have visited. The ultimate goal of this research was to develop a model for destination loyalty management. Thus, future research can compare these two different mechanisms influencing revisit intention as the next step.

This research examined the effects of the sense of presence on revisit intention with personal nostalgia as a mediator. Revisit intention was studied because it is a key indicator of

destination loyalty (Li et al., 2010). However, there are also other attitudinal loyalty measures including recommendation intentions and attitude towards a destination. The effects of the sense of presence and personal nostalgia could be different on those measures. Therefore, future research can expand this research including various destination loyalty measures to develop a comprehensive destination loyalty management model.

This research focused on past visitors to help destination marketers manage destination loyalty and found that personal nostalgia fully mediated the relationship between the sense of presence and revisit intention. This implies that past visitors process information differently from potential visitors. Thus, this research suggested destinations implementing different marketing strategies for the two visitor groups. However, this research did not systematically compare past visitors and potential visitors. Therefore, future research can focus on the differences in information processing between the two visitor groups to help destinations better manage visitors.

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APPENDIX A: INSTRUMENT USAGE APPROVAL LETTER

BN **Barbora Nevosadova <barbora@sygictravel.com>**
4:16 AM

To: Yoon, Violet

Hi Violet,
Thank you for reaching out. It is OK to use the video via our YouTube channel.

I wish you the best of luck with your research.

Best regards,

Barbora Nevosadova

Sygic Travel
https://travel.sygic.com
Phone: +420 777 872 517

APPENDIX B: QUESTIONNAIRE – PHASE 1 (PRE-STIMULUS SECTION)

NYC Study – Pre-Stimulus

Start of Block: Screening

We would like to ask you some questions before moving forward to the next step.

Are you currently 18 years old or older?

- Yes
- No

Are you a resident of New York City?

- Yes
- No

Have you visited New York City?

- Yes
- No

Do you plan to visit New York City in the next two weeks?

- Yes
- No

Do you have any pre-existing medical conditions in which you need to consult with your physician before using any electronic devices?

- Yes
- No

Have you experienced severe dizziness, seizures, eye or muscle twitching or blackouts triggered by light flashes or patterns?

- ○ Yes
- ○ No

Do you have a cardiac pacemaker, hearing aids, defibrillators, or other implanted medical device?

- ○ Yes
- ○ No

End of Block: Screening

Start of Block: Consent form

You are being asked to participate in a voluntary research study. The purpose of this study is to understand the effect of a virtual New York City experience on your perceptions and attitudes toward New York City. This research consists of two phases. Phase 2 is optional.

Phase 1
Participants in this phase will watch a 360-degree video about a guided tour to New York City and answer a series of questions about their perceptions and attitudes toward New York City and your wellness at a laboratory. Your participation will last no more than 15 minutes in total. Risks related to this research include a low possibility of feeling motion sickness; benefits related to this research include a possibility of emotional benefits. The alternative to participating in this research is not to participate.

Phase 2 (Optional)
Participants who completed phase 1 will receive an email about a chance to voluntarily participate in phase 2. Participants will answer a series of questions online about the virtual New York City experience. Risks related to this research are no more than minimal risk. The alternative to participating in this research is not to participate.

Principal Investigator Name and Title: Dr. Suiwen (Sharon) Zou, Assistant Professor
Department and Institution: Department of Recreation, Sport and Tourism, the University of Illinois at Urbana-Champaign
Contact Information: szou@illinois.edu or 217-244-1772.

Why am I being asked? You have been asked to participate in this research because you are over 18, have visited New York City, and not currently a resident of New York City.

Approximately 120 participants will be involved in this research at the University of Illinois at Urbana-Champaign. Your participation in this research is voluntary. Your decision on whether or not to participate will not affect your current or future dealings with the University of Illinois at Urbana-Champaign. If you decide to participate, you are free to withdraw at any time without affecting that relationship.

What procedures are involved?
Phase 1
Participants will first complete a survey about your past experience in New York City for 5 minutes and then schedule an in-lab visit. At the laboratory, you will watch a 360-degree video about a guided tour to New York City for 5 minutes, followed by answering a survey about your perceptions and attitudes toward New York City and your wellness for 5 minutes. The appointment will take place in a lab located at the University of Illinois at Urbana-Champaign (302A and 302 B in Huff). The laboratory session will last about 10 minutes. You will need to come to the study site only once.

Phase 2 (Optional)
Participants will answer a series of questions about the virtual New York City experience using an online survey.

What are the potential risks and discomforts? There will be a low possibility of feeling motion sickness due to the 360-degree video.

Are there benefits to participating in the research? You may experience an emotional benefit from participation in the research. Your participation will contribute to the advancement of the tourism industry and communities seeking tourism development.

What other options are there? You have the option to not participate in this study.

Will my study-related information be kept confidential? Faculty, staff, students, and others with permission or authority to see your study information will maintain its confidentiality to the extent permitted and required by laws and university policies. The names or personal identifiers of participants will not be collected, published, or presented.

Will I be reimbursed for any expenses or paid for my participation in this research?
Phase 1
In appreciation, you will be rewarded a medium size coffee coupon that you can redeem at Café Paradiso upon completion of the study at the laboratory.

Phase 2 (Optional)
You will have a chance to enter a drawing for one of the $20 Amazon gift cards. The chance to win a gift card is 8.3% ~ 100%.

Can I withdraw or be removed from the study? If you decide to participate, you are free to withdraw your consent and discontinue participation at any time. The researchers also have the right to stop your participation in this study without your consent if they believe it is in your best

interests, you were to object to any future changes that may be made in the study plan, and/or you are disruptive to the research process.

Will data collected from me be used for any other research? Your de-identified information could be used for future research without additional informed consent.

Who should I contact if I have questions? Contact the researcher Violet Yoon at hyunseo2@illinois.edu or Sharon Zou at szou@illinois.edu if you have any questions about this study or your part in it, or if you have concerns or complaints about the research.

What are my rights as a research subject? If you have any questions about your rights as a participant in this study, please contact the University of Illinois at Urbana-Champaign Office for the Protection of Research Subjects at 217-333-2670 or irb@illinois.edu.

Please print or screenshot this consent form if you want to keep a copy for your record.

University of Illinois at Urbana-Champaign
Institutional Review Board
Approved November 26, 2022
IRB #23479

○ **I have read the above information. I have been given an opportunity to ask questions and my questions have been answered to my satisfaction. I agree to participate in this research.**

End of Block: Consent form

Start of Block: Pre-test

The following questions are about your attitudes toward New York City.

To what extent do you agree or disagree with the following statements?

	Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree
I expect to revisit New York City in the future.	○	○	○	○	○	○	○
It is likely that I will revisit New York City in the future.	○	○	○	○	○	○	○
I can see myself visiting New York City again in the future.	○	○	○	○	○	○	○

To what extent do you agree or disagree with the following statements?

	Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree
I will say positive things about New York City to other people.	○	○	○	○	○	○	○
I will recommend New York City to someone who seeks my advice.	○	○	○	○	○	○	○
I will encourage friends and relatives to visit New York City.	○	○	○	○	○	○	○

To what extent do you agree or disagree with the following statements?

	Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree
New York City is appealing as a tourist destination.	○	○	○	○	○	○	○
New York City is good as a tourist destination.	○	○	○	○	○	○	○
New York City is favorable as a tourist destination.	○	○	○	○	○	○	○
New York City is likable as a tourist destination.	○	○	○	○	○	○	○

To what extent do you agree or disagree with the following statements?

	Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree
Right now, I am feeling nostalgic about my past visit(s) to New York City.	○	○	○	○	○	○	○
Right now, I am immersed in fond memories from my past visit(s) to New York City.	○	○	○	○	○	○	○
Right now, I am thinking of good memories from my past visit(s) to New York City	○	○	○	○	○	○	○
Please check "Strongly disagree" for this attention-check question.	○	○	○	○	○	○	○

End of Block: Pre-test

Start of Block: Control variables

The following questions are about your familiarity with New York City.

To what extent do you agree or disagree with the following statements?

	Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree
I feel New York City is part of me.	○	○	○	○	○	○	○
I identify strongly with New York City.	○	○	○	○	○	○	○
Visiting New York City says a lot about who I am.	○	○	○	○	○	○	○

To what extent do you agree or disagree with the following statements?

	Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree
I enjoy visiting New York City more than any other destination.	○	○	○	○	○	○	○
New York City is the best place for what I like to do on vacations.	○	○	○	○	○	○	○
No other place can provide the same vacation experience as New York City.	○	○	○	○	○	○	○

To what extent do you agree or disagree with the following statements?

	Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree
New York City means a lot to me.	○	○	○	○	○	○	○
I am very attached to New York City.	○	○	○	○	○	○	○
I feel a strong sense of belonging to New York City.	○	○	○	○	○	○	○

End of Block: Control variables

Start of Block: Past Visits

The following questions are about your past visit(s) to New York City.

How many times have you visited New York City?

_____

When was your most recent visit to New York City?

- ○ Month (format: mm) _____
- ○ Year (format: yyyy) _____

To what extent were you satisfied with your most recent visit to New York City?

- ○ Extremely dissatisfied
- ○ Moderately dissatisfied
- ○ Slightly dissatisfied
- ○ Neither satisfied nor dissatisfied
- ○ Slightly satisfied
- ○ Moderately satisfied
- ○ Extremely satisfied

Which of the following best describes your most recent visit to New York City?

- ○ A leisure trip
- ○ Visiting family or friends
- ○ A business trip
- ○ Other (Please specify) _____

Have you ever resided in New York City?

- ○ Yes
- ○ No

Display This Question:

If Have you ever resided in New York City? = Yes

If you have resided in New York City, how long was the longest residency?

- ○ Less than a month
- ○ One month to less than 6 months
- ○ 6 months to less than a year
- ○ A year to less than 5 years
- ○ More than 5 years

End of Block: Past Visits

Start of Block: Scheduling

Please provide your email address. We will send you a confirmation email regarding the lab session.

_____

These are your unique four-digit participant numbers.

Participant #: ${rand://int/1000:9999}

Please type these numbers in the box below.

_____

Please click 'Schedule an appointment' below when you are ready to schedule an appointment.

Schedule an appointment

End of Block: Scheduling

APPENDIX C: QUESTIONNAIRE – PHASE 1 (PRO-STIMULUS SECTION)

NYC Study - Post-Stimulus

Start of Block: Identification

Please type your 4-digit participant numbers.

_____

End of Block: Identification

***Randomly assigned to one of the two blocks below**

Start of Block: High sense of presence

You will now watch a virtual New York City tour video using a VR headset.

The researcher will come for assistance soon.

Page Break

Did you watch the video, and are you ready to continue the survey?

○ Yes

End of Block: High sense of presence

Start of Block: Low sense of presence

You will now watch a virtual New York City tour video using a tablet PC.

The researcher will come for assistance soon.

Page Break

Did you watch the video, and are you ready to continue the survey?

○ Yes

End of Block: Low sense of presence

Start of Block: Presence

The following questions are about the level of a sense of presence while watching the video.

To what extent do you agree or disagree with the following statements?

	Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree
While watching the video, I felt I was in the virtual world.	○	○	○	○	○	○	○
While watching the video, my body was in the room, but my mind was inside the virtual world.	○	○	○	○	○	○	○
While watching the video, the virtual world was more real or present for me compared to the real world.	○	○	○	○	○	○	○

End of Block: Presence

Start of Block: Post-test

The following questions are about your attitudes toward New York City.

To what extent do you agree or disagree with the following statements?

	Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree
I expect to revisit New York City in the future.	○	○	○	○	○	○	○
It is likely that I will revisit New York City in the future.	○	○	○	○	○	○	○
I can see myself visiting New York City again in the future.	○	○	○	○	○	○	○

To what extent do you agree or disagree with the following statements?

	Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree
I will say positive things about New York City to other people.	○	○	○	○	○	○	○
I will recommend New York City to someone who seeks my advice.	○	○	○	○	○	○	○
I will encourage friends and relatives to visit New York City.	○	○	○	○	○	○	○

To what extent do you agree or disagree with the following statements?

	Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree
New York City is appealing as a tourist destination.	○	○	○	○	○	○	○
New York City is good as a tourist destination.	○	○	○	○	○	○	○
New York City is favorable as a tourist destination.	○	○	○	○	○	○	○
New York City is likable as a tourist destination.	○	○	○	○	○	○	○

To what extent do you agree or disagree with the following statements?

	Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree
Right now, I am feeling nostalgic about my past visit(s) to New York City.	○	○	○	○	○	○	○
Right now, I am immersed in fond memories from my past visit(s) to New York City.	○	○	○	○	○	○	○
Right now, I am thinking of good memories from my past visit(s) to New York City.	○	○	○	○	○	○	○
Please check "Strongly disagree" for this attention-check question.	○	○	○	○	○	○	○

End of Block: Post-test

Start of Block: Potential Variables

The following questions are about your perceptions about the video you watched in the lab.

To what extent do you agree or disagree with the following statements?

	Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree
When I watched this video, I was transported back in time when I visited New York City.	○	○	○	○	○	○	○
My past visit(s) to New York City can be described using this video.	○	○	○	○	○	○	○
This video shows what I experienced in New York City.	○	○	○	○	○	○	○

How many places shown in the video you have visited?

None of them 0	1	2	3	4	5	6	7	8	9	All of them 10
○	○	○	○	○	○	○	○	○	○	○

To what extent do you agree or disagree with the following statements?

	Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree
Watching this video was fun.	○	○	○	○	○	○	○
Watching this video was pleasant.	○	○	○	○	○	○	○
Watching this video was enjoyable.	○	○	○	○	○	○	○
Watching this video was exciting.	○	○	○	○	○	○	○
Watching this video was interesting.	○	○	○	○	○	○	○

End of Block: Potential Variables

Start of Block: Wellness

The following questions are about your wellness.

Please answer the following questions.

	Never	Sometimes	About half the time	Most of the time	Always
How much of the time during the past two weeks were you happy?	○	○	○	○	○
How much of the time during the past two weeks did you enjoy life?	○	○	○	○	○

Please answer the following questions.

	Never	Sometimes	About half the time	Most of the time	Always
How much of the time during the past two weeks did you feel sad?	○	○	○	○	○
How much of the time during the past two weeks did you feel depressed?	○	○	○	○	○

To what extent do you agree or disagree with the following statements?

	Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree
In most ways, my life is close to my ideal.	○	○	○	○	○	○	○
The conditions of my life are excellent.	○	○	○	○	○	○	○
I am satisfied with my life.	○	○	○	○	○	○	○
So far I have gotten the important things I want in life.	○	○	○	○	○	○	○
If I could live my life over, I would change almost nothing.	○	○	○	○	○	○	○

End of Block: Wellness

Start of Block: Control Variable

The following question is about your travel pattern.

To what extent do you agree or disagree with the following statements?

	Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree
It is important for me to experience something different when traveling.	○	○	○	○	○	○	○
It is important for me to feel the unique atmosphere of the travel destination.	○	○	○	○	○	○	○
It is important for me to learn new things or increase knowledge when traveling	○	○	○	○	○	○	○

End of Block: Control Variable

Start of Block: Demographics

Now a few questions about you that will help us better understand your answers.

What year were you born?

_____

What is your gender?

- ○ Male
- ○ Female
- ○ Other
- ○ Decline to answer

What is your approximate average household income per year?

- ○ Less than $20,000
- ○ $20,000 to $39,999
- ○ $40,000 to $59,999
- ○ $60,000 to $79,999
- ○ $80,000 to $99,999
- ○ $100,000 to $119,999
- ○ $120,000 to $149,999
- ○ $150,000 to $199,999
- ○ more than $200,000
- ○ Decline to answer

What is the highest degree or level of school you have completed? (If you are currently enrolled in school, please indicate the highest degree you have received.)

- ○ Less than high school
- ○ High school graduate
- ○ Some college but no degree
- ○ College degree
- ○ Bachelor's degree
- ○ Master's degree
- ○ Doctorate/Ph.D. degree
- ○ Professional degree
- ○ Other

What is you race? Check all that apply.

- [ ] Black or African American
- [ ] Native American/ Alaska Native
- [ ] Native Hawaiian/ Pacific Islander
- [ ] Asian
- [ ] White/ European American
- [ ] Other
- [ ] ⊗Decline to answer

End of Block: Demographics

Start of Block: Debriefing

Thank you for your participation in this study. The goal of this study was to examine if a sense of presence, facilitated by a virtual reality experience of New York City, increases your perceptions and attitudes toward NYC. You were randomly assigned to watch the virtual tour either via an iPad or a VR headset. The reason why this randomization was not informed in advance is that we did not want the purpose of the study to be apparent, as it could influence the findings.

If you would like to learn more about this study topic, please reference the following article. Shin, H. H., & Jeong, M. (2022). Does a virtual trip evoke travelers' nostalgia and derive intentions to visit the destination, a similar destination, and share?: Nostalgia-motivated tourism. Journal of Travel & Tourism Marketing, 39(1), 1–17.

If you have any questions regarding the study and your participation, you may contact the main researcher of this study, Violet Yoon at hyunseo2@illinois.edu. Again, thank you for your participation.

Please find the researcher at the entrance for a gift card.

End of Block: Debriefing

APPENDIX D: SUMMARY OF MEASUREMENTS

Variable	Subdomain	Question	Operationalization	Source
Personal Nostalgia		- Right now, I am feeling nostalgic about my past visit(s) to New York City. - Right now, I am immersed in fond memories from my past visit(s) to New York City. - Right now, I am thinking of good memories from my past visit(s) to New York City	7-point Likert Scale: 1 = Strongly disagree 2= Disagree 3 = Somewhat disagree 4 = Neither disagree nor agree 5 = Somewhat agree 6 = Agree 7 = Strongly agree	Hu & Xu (2021)
Revisit Intention		- I expect to revisit New York City in the future. - It is likely that I revisit New York City in the future. - I can see myself visiting New York City again in the future.	7-point Likert Scale: 1 = Strongly disagree 2= Disagree 3 = Somewhat disagree 4 = Neither disagree nor agree 5 = Somewhat agree 6 = Agree 7 = Strongly agree	Tussyadiah et al. (2018)
Sense of Presence		- While watching the video, I felt I was in the virtual world. - While watching the video, my body was in the room, but my mind was inside the virtual world. - While watching the video, the virtual world was more real or present for me compared to the real world.	7-point Likert Scale: 1 = Strongly disagree 2= Disagree 3 = Somewhat disagree 4 = Neither disagree nor agree 5 = Somewhat agree 6 = Agree 7 = Strongly agree	Kim & Biocca (1997); Ying et al. (2021)
Temporal Distance		-When was your most recent visit to New York City?	Open-ended	
Destination Satisfaction		-To what extent are you satisfied with your most recent visit to New York City?	7-point Likert Scale: 1 = Extremely dissatisfied 2= Moderately dissatisfied 3 = Slightly dissatisfied 4 = Neither satisfied nor dissatisfied 5 = Slightly satisfied 6 = Moderately satisfied 7 = Extremely satisfied	Taplin et al. (2016)

Novelty-Seeking		-It is important for me to experience something different when traveling. - It is important for me to feel the special atmosphere of the travel destination. - It is important for me to learn new things or increase knowledge when traveling.	7-point Likert Scale: 1 = Strongly disagree 2= Disagree 3 = Somewhat disagree 4 = Neither disagree nor agree 5 = Somewhat agree 6 = Agree 7 = Strongly agree	Crompton (1979); Li & Cai (2012)
Place Attachment	Place Identity	- I feel New York City is part of me. - I identify strongly with New York City. - Visiting New York City says a lot about who I am.	7-point Likert Scale: 1 = Strongly disagree 2= Disagree 3 = Somewhat disagree 4 = Neither disagree nor agree 5 = Somewhat agree 6 = Agree 7 = Strongly agree	Yuksel et al. (2010)
	Place Dependence	- I enjoy visiting New York City more than any other destinations. - New York City is the best place for what I like to do on holidays. - No other place can provide the same holiday experience as New York City.		
	Affective Attachment	-New York City means a lot to me. -I am very attached to New York City. -I feel a strong sense of belonging to New York City.		

APPENDIX E: IRB LETTERS

UNIVERSITY OF ILLINOIS URBANA-CHAMPAIGN

Office of the Vice Chancellor for Research & Innovation
Office for the Protection of Research Subjects
805 W. Pennsylvania Ave., MC-095
Urbana, IL 61801-4822

Notice of Approval: New Submission

November 8, 2022

Principal Investigator	Suiwen Zou
CC	Carla Santos; Hyunseo Yoon
Protocol Title	*Can Virtual Reality Encourage Repeat Visitation? The Mediating Role of Nostalgia*
Protocol Number	23479
Funding Source	Internal funds
Review Type	Expedited 7
Status	Active
Risk Determination	No more than minimal risk
Approval Date	November 7, 2022
Expiration Date	November 6, 2027

This letter authorizes the use of human subjects in the above protocol. The University of Illinois at Urbana-Champaign Institutional Review Board (IRB) has reviewed and approved the research study as described.

The Principal Investigator of this study is responsible for:

- Conducting research in a manner consistent with the requirements of the University and federal regulations found at 45 CFR 46.
- Using the approved consent documents, with the footer, from this approved package.
- Requesting approval from the IRB prior to implementing modifications.
- Notifying OPRS of any problems involving human subjects, including unanticipated events, participant complaints, or protocol deviations.
- Notifying OPRS of the completion of the study.

UNIVERSITY OF ILLINOIS URBANA-CHAMPAIGN

Office of the Vice Chancellor for Research & Innovation
Office for the Protection of Research Subjects
805 W. Pennsylvania Ave., MC-095
Urbana, IL 61801-4822

Notice of Approval: Amendment 01

November 28, 2022

Principal Investigator	Suiwen Zou
CC	Carla Santos; Hyunseo Yoon
Protocol Title	*Can Virtual Reality Encourage Repeat Visitation? The Mediating Role of Nostalgia*
Protocol Number	23479
Funding Source	Internal funds
Review Type	Expedited 7
Amendment Requested	• Updating wording on existing survey items • Added questions in the post-stimulus survey. • Recruitment timeline was updated to ensure similar time intervals for all participants between phase 1 and phase 2
Status	Active
Risk Determination	No more than minimal risk
Amendment Approval Date	November 26, 2022
Expiration Date	November 6, 2027

This letter authorizes the use of human subjects in the above protocol. The University of Illinois at Urbana-Champaign Institutional Review Board (IRB) has reviewed and approved the research study as described.

The Principal Investigator of this study is responsible for:

- Conducting research in a manner consistent with the requirements of the University and federal regulations found at 45 CFR 46.
- Using the approved consent documents, with the footer, from this approved package.
- Requesting approval from the IRB prior to implementing modifications.
- Notifying OPRS of any problems involving human subjects, including unanticipated events, participant complaints, or protocol deviations.
- Notifying OPRS of the completion of the study.

UNIVERSITY OF ILLINOIS URBANA-CHAMPAIGN

Office of the Vice Chancellor for Research & Innovation
Office for the Protection of Research Subjects
805 W. Pennsylvania Ave., MC-095
Urbana, IL 61801-4822

Notice of Approval: Amendment 02

January 4, 2023

Principal Investigator	Suiwen Zou
CC	Hyunseo Yoon; Carla Santos
Protocol Title	*Can Virtual Reality Encourage Repeat Visitation? The Mediating Role of Nostalgia*
Protocol Number	23479
Funding Source	One of researchers' internal research account
Review Type	Expedited 7
Amendment Requested	•Added recruitment method
Risk Determination	No more than minimal risk
Status	Active
Amendment Approval Date	January 3, 2023
Expiration Date	November 6, 2027

This letter authorizes the use of human subjects in the above protocol. The University of Illinois at Urbana-Champaign Institutional Review Board (IRB) has reviewed and approved the research study as described.

The Principal Investigator of this study is responsible for:

- Conducting research in a manner consistent with the requirements of the University and federal regulations found at 45 CFR 46.
- Using the approved consent documents, with the footer, from this approved package.
- Requesting approval from the IRB prior to implementing modifications.
- Notifying OPRS of any problems involving human subjects, including unanticipated events, participant complaints, or protocol deviations.
- Notifying OPRS of the completion of the study.

UNIVERSITY OF ILLINOIS URBANA-CHAMPAIGN

Office of the Vice Chancellor for Research & Innovation
Office for the Protection of Research Subjects
805 W. Pennsylvania Ave., MC-095
Urbana, IL 61801-4822

Notice of Approval: Amendment 03

January 20, 2023

Principal Investigator	Suiwen Zou
CC	Carla Santos; Hyunseo Yoon
Protocol Title	*Can Virtual Reality Encourage Repeat Visitation? The Mediating Role of Nostalgia*
Protocol Number	23479
Funding Source	Internal funds
Review Type	Expedited 7
Amendment Requested	• Updating research team
Status	Active
Risk Determination	No more than minimal risk
Amendment Approval Date	January 20, 2023
Expiration Date	November 6, 2027

This letter authorizes the use of human subjects in the above protocol. The University of Illinois at Urbana-Champaign Institutional Review Board (IRB) has reviewed and approved the research study as described.

The Principal Investigator of this study is responsible for:

- Conducting research in a manner consistent with the requirements of the University and federal regulations found at 45 CFR 46.
- Using the approved consent documents, with the footer, from this approved package.
- Requesting approval from the IRB prior to implementing modifications.
- Notifying OPRS of any problems involving human subjects, including unanticipated events, participant complaints, or protocol deviations.
- Notifying OPRS of the completion of the study.

APPENDIX F: QUESTIONNAIRE – PHASE 2

NYC Study - Follow up

Start of Block: Intro

Thank you for participating in the Phase 2 of NYC study. This survey consists of several open-ended questions about the virtual NYC experience you recently had at our lab. All your responses are anonymous and NOT connected to the surveys you took during the Phase 1. Please answer the questions as honest as possible. Only complete and valid responses will be considered for the drawing. A desktop or laptop is encouraged to take this survey.

The first question is about your participation in the Phase 1 of NYC study.

Which device did you use to watch the virtual NYC tour video?

- ○ VR headset
- ○ iPad

End of Block: Intro

Start of Block: NYC

The following questions are about the virtual NYC tour video you watched at the lab. Please provide as much detail as possible.

When watching the virtual NYC tour video, how did you feel and what were you thinking?

_____

_____

_____

_____

Did the virtual NYC tour video remind you of past visit(s) to NYC? If yes, how and why? If not, why not?

_____

_____

_____

_____

After watching the virtual NYC tour video, did you feel nostalgic about your past visit(s) to NYC (i.e., missing your past visit(s) to NYC)? If yes, how and why? If not, why not?

_____

_____

_____

_____

After watching the virtual NYC tour video, did your attitude toward NYC change (e.g., becoming more positive)? If yes, how and why? If not, why?

_____

_____

_____

_____

After watching the virtual NYC tour video, did your intention to revisit NYC change? If yes, how and why? If not, why?

_____

_____

_____

_____

After watching the virtual NYC tour video, did you or will you take any actions such as (but not limited to) talking about your past NYC visits with others, viewing photos taken from past visits,

or contacting friends/family in NYC? If yes, what actions did you or will you take and why? If not, why?

_____

_____

_____

_____

(Optional) Please tell us if there are any other things you want to talk about the virtual NYC experience you had in the lab or something about this research.

_____

_____

_____

_____

End of Block: NYC

Start of Block: Demographics

Now a few questions about you that will help us better understand your answers.

What year were you born?

_____

What is your gender?

- ○ Male
- ○ Female
- ○ Other
- ○ Decline to answer

What is your approximate average household income per year?

- ○ Less than $20,000
- ○ $20,000 to $39,999
- ○ $40,000 to $59,999
- ○ $60,000 to $79,999
- ○ $80,000 to $99,999
- ○ $100,000 to $119,999
- ○ $120,000 to $149,999
- ○ $150,000 to $199,999
- ○ more than $200,000
- ○ Decline to answer

What is the highest degree or level of school you have completed? (If you are currently enrolled in school, please indicate the highest degree you have received.)

- ○ Less than high school
- ○ High school graduate
- ○ Some college but no degree
- ○ College degree
- ○ Bachelor's degree
- ○ Master's degree
- ○ Doctorate/Ph.D. degree
- ○ Professional degree
- ○ Other

What is you race? Check all that apply.

- ☐ Black or African American
- ☐ Native American/ Alaska Native
- ☐ Native Hawaiian/ Pacific Islander
- ☐ Asian
- ☐ White/ European American
- ☐ Other
- ☐ ⊗Decline to answer

End of Block: Demographics

Start of Block: Raffle

In thanks for completing this survey, would you like to enter a drawing for a $20 Amazon gift card?

- ○ Yes.
- ○ No thanks.

End of Block: Raffle

Start of Block: Email

Here is your unique participant ID and timestamp for the $20 Amazon gift card drawings. Please screenshot this page or record them for future verification purposes.

Participant ID: ${e://Field/Participant%20ID}
Timestamp: ${e://Field/Timestamp}

The winner will be announced on 3/30/2022 at the following URL. Capture either the URL or the QR code below so you know where to check to see if you won.

URL: https://illinoisahs.co1.qualtrics.com/jfe/form/SV_cZVpbLaAqVCYkB0

QR code:

Thank you so much for your participation.

End of Block: Email