Age-Inclusive Hospitality and Tourism: Navigating the Metaverse Travel with Avatar

Fei Hao[a*], Ki-Joon Back[b], Kaye Chon[a]

a. School of Hotel and Tourism Management, The Hong Kong Polytechnic University, Hong Kong SAR, China.
b. Conrad N. Hilton College of Global Hospitality Leadership, University of Houston, U.S.

* Corresponding author

Fei Hao is the corresponding author and she can be reached by Tel: +852-3400 2291 and Email: ffaye.hao@polyu.edu.hk

Emails: ffaye.hao@polyu.edu.hk (F Hao), kback@central.uh.edu (KJ Back), kaye.chon@polyu.edu.hk (K Chon)

Fei Hao, Ph.D., is Assistant Professor in the School of Hotel and Tourism Management, The Hong Kong Polytechnic University, Hong Kong SAR, China. https//orcid.org/0000-0002-2295-7255

Ki-Joon Back, Ph.D., is Associate Dean for Research & Graduate Studies, Moores Chair Professor, Conrad N. Hilton College of Global Hospitality Leadership, University of Houston, U.S.

Kaye Chon, Ph.D., is Dean and Chair Professor, Walter & Wendy Kwok Family Foundation Professor in International Hospitality Management in the School of Hotel and Tourism Management, The Hong Kong Polytechnic University, Hong Kong SAR, China. https//orcid.org/0000-0001-7981-4741

Acknowledgment: This project received funding from The Hong Kong Polytechnic University (UGC), [P0043849]; The Hong Kong Polytechnic University (UGC) under VP(RI)'s Special Allocation, [P0045695]; the University Grants Committee (Hong Kong) under the Mr and Mrs Chan Chak Fu Research Assistantship, [P0045911]; the Research Grants Council under the RGC Early Career Scheme, [P0047204, 25504823]; the Innovation and Technology Commission, [P0043294, ITS/028/22FP]; and the Research Grants Council under the RGC General Research Fund, [15505324]; and Walter & Wendy Kwok Family Foundation Professorship in International Hospitality Management.

Conflict of interest: There is no conflict of interest to declare.

The following publication Hao, F., Back, K.-J. and Chon, K.K.S.K.-S. (2025), "Age-inclusive hospitality and tourism: navigating the metaverse travel with avatar", International Journal of Contemporary Hospitality Management, Vol. 37 No. 2, pp. 482-501 is published by Emerald and is available at https://doi.org/10.1108/IJCHM-03-2024-0323.

Age-Inclusive Hospitality and Tourism: Navigating the Metaverse Travel with Avatar

Purpose: This study investigates the impact of virtual tours on the engagement and travel intentions of older adults, emphasizing the role of emotional and informative content. It aims to enhance travel confidence and reduce stress among older travelers, fostering inclusive tourism through advanced avatar technology.

Design/Methodology/Approach: Employing two between-subjects experiments, this research compares the effects of emotion-driven and knowledge-centric virtual tours on older adults. It explores the mediating role of travel confidence and stress reduction, along with the moderating influence of positive psychological cues on engagement and travel intentions.

Findings: The results highlight the potential of technology in promoting inclusive tourism. Emotionally engaging virtual tours significantly increase travel intentions among older adults by boosting confidence and alleviating stress, with positive psychological cues enhancing these effects.

Originality/Value: This study extends the socioemotional selectivity theory to the realm of metaverse travel, providing a novel perspective on the emotional and cognitive engagement of older adults in the metaverse. This underscores the importance of inclusive technology in addressing the needs of older travelers.

Practical Implications: The study offers valuable insights for tourism industry stakeholders by suggesting the development of avatar-based virtual tours tailored to the emotional and cognitive needs of older travelers. This approach could create more accessible and satisfying tourism experiences for older travelers.

Keywords: Older Traveler, Metaverse, Avatar, Inclusive Technology, Socioemotional Selectivity Theory, Engagement

Introduction

Contemporary society confronts unprecedented global aging owing to decreased fertility and mortality rates alongside extended life expectancy (United Nations, 2020). This demographic shift profoundly affects future socioeconomic dynamics. Older adults often struggle with everyday complexities that intersect with rapidly evolving technologies, given the decline in their biological and cognitive functions. They are often stigmatized by "technophobia," suggesting an uneasy relationship with technology (Leonardi *et al.*, 2008). This study defines "older" participants as those aged 60 or over, recognizing their increased adoption of technology services but ongoing challenges in doing so (United Nations, 2020). Recent data indicates significant disparities in technology adoption among older adults. Pew Research Center (2023) reveals that only 61% of people aged 75 years and older own smartphones versus 95% of those aged 50–64. Additionally, only 44% of people aged 75 years and older use the Internet daily. Involving older adults in developing technology-driven services fosters inclusivity and benefits society.

Technological innovations offer cost-effective solutions for older adults, promoting physical independence, better health outcomes, and enhanced well-being by addressing social isolation and improving self-esteem and quality of life (Chen and Schulz, 2014). However, many older adults struggle with social isolation and a lack of adequate support. Recent research underscores the significant benefits of technology use among older generations (The National Science and Technology Council, 2019). Communication technology enables older adults to stay connected and access information. Additionally, active technological involvement in social contexts enhances their well-being, self-esteem, self-regulation, and quality of life (Leonardi *et al.*, 2008). Augmented reality (AR) enhances cognitive rehabilitation in older adults with mild cognitive impairment, leading to sustained engagement and improved cognitive functions (Bibbò *et al*, 2024). Additionally, immersive virtual reality (VR) environments aid in physical therapy, improve mobility, and reduce pain in older patients with chronic conditions (Johnson and Lee, 2023).

Given the benefits of technology for older adults, developing technologies tailored to older consumers across all service sectors is crucial (Leonardi *et al.*, 2008). Governments worldwide are implementing proactive measures to enhance the digital literacy of older adults. The World Health Organization's Age-Friendly City project fosters successful aging by creating inclusive urban structures. It has expanded to over 1,400 cities, significantly improving the urban livability of seniors by enhancing accessibility (WHO, 2023). The U.S. National Science and Technology Council (2019) report on "Emerging Technologies to Support an Aging Population" identifies technologies to facilitate aging in place. Despite these initiatives, older adults remain underserved in technology-driven service innovations in tourism and hospitality.

Avatar-guided virtual tours are gaining prominence as they enhance travel experiences, particularly among older adults. Virtual tours immerse users in digital environments, and avatars offer assistance and tailored narratives throughout these experiences (Gilbert and Forney, 2015). Users can ask questions to the avatars and receive personalized responses (Viñals *et al.*, 2021). This innovation aligns with the growth of the global metaverse market within travel and tourism, which is projected to expand by $188.24 billion from 2022 to 2026. The increasing demand for AR and VR technologies, combined with the integration of 5G networks and digital assets, is expected to redefine the future of tourism by enhancing booking experiences and increasing booking volumes (Agnihotri *et al.*, 2024).

Avatar-guided virtual tours could significantly enhance the travel intention of older adults (El-Said and Aziz, 2022). By being cost-effective and easily customizable, these virtual experiences increase the likelihood of travel by boosting the travel confidence of those with mobility limitations or health concerns (Lu *et al.*, 2022). Furthermore, the controlled environment of virtual tours substantially reduces travel-related stress, thereby encouraging more frequent engagement with new travel opportunities. These tours also help address older adults' resistance to change by introducing them to technology-driven experiences in a familiar and reassuring manner (Yang *et al.*, 2021). Avatar-guided virtual tours are tailored to individual preferences, thereby enhancing engagement and satisfaction (Xie *et al.*, 2021). Emotion-oriented tours focus on creating connections and positive emotional experiences, making virtual travel more appealing and relatable (Yang *et al.,* 2021).

Conversely, knowledge-focused tours cater to intellectual curiosity and enhance the understanding of destinations, fostering a sense of competence and security that bolsters travel confidence (Meier *et al.*, 2020). While existing studies explore the individual effects of virtual engagement on travel confidence and intention, they do not examine how the interplay of tour orientation (emotion-focused vs. knowledge-focused) and positive psychological cues shapes these constructs, especially in the context of older adults. Therefore, our study explores how emotion-oriented and knowledge-focused tours influence travel intention, confidence, and stress reduction among older adults, thus contributing to the literature on inclusive digital tourism.

This study builds upon the existing research on avatar-guided virtual tours by focusing on its socioemotional impacts on older adults, a demographic that is less explored in this context. While previous research primarily focuses on technological aspects (Wojciechowski *et al.*, 2021), our study investigates how virtual interactions influence travel intentions and perceived accessibility among older travelers. Unlike earlier studies that broadly address digital tourism (El-Said and Aziz, 2022; Gursoy *et al.,* 2022; Xie *et al.,* 2021), we focus on age-related nuances. Rooted in the socioemotional selectivity theory (SST), older adults tend to value emotional rewards over knowledge acquisition when interfaced with emerging technologies (Löckenhoff and Carstensen, 2004). We conduct two experiments to examine the influence of tour orientation (emotion-focused vs. knowledge-focused) and the role of positive psychological cues (presence vs. absence) on virtual engagement. We investigate how virtual engagement influences travel intentions, mediated by enhanced travel confidence and stress reduction. This study enriches the existing literature on SST and inclusive digital tourism. We provide insights for tourism operators, VR developers, gerontologists, and policymakers, enabling them to better understand and meet the specific needs of older travelers through customized virtual travel experiences that enhance their engagement and travel confidence.

Literature Review

Metaverse Travel

Metaverse travel is a digital realm in which users interact in immersive environments through AR or VR. Gursoy *et al.* (2022) emphasize its potential to elevate customer engagement and conceptualize it as a realm in which users explore diverse locales based on the comfort of their own space. Buhalis *et al.* (2023) highlight the metaverse's revolutionary role in marketing and management, offering innovative previews and engagement methods. Go and Kang (2023) underscore the alignment of metaverse travel with sustainable tourism goals by minimizing environmental impacts while expanding global access. Chen (2024) shows how the metaverse transcends physical boundaries to reshape tourist-destination interactions.

The metaverse has the potential to redefine industrial paradigms (Ashton *et al.,* 2024; Zaman *et al.,* 2024). Metaverse travel destinations can evoke a strong sense of place, fostering emotional connections and enhancing brand loyalty (Miao *et al.,* 2024). Furthermore, the similarity between real and virtual environments affects visitor intentions, requiring virtual destinations to closely mirror their physical counterparts (Shin *et al.,* 2024). Consequently, the metaverse significantly impacts tourism, altering how destinations, travelers, and stakeholders interact (Cheung *et al.,* 2024).

Often accompanied by digital guides, metaverse travel is considered safe, accessible, and cost-effective for older adults (Wojciechowski *et al.,* 2021). Avatars can be personalized to meet the preferences of older adults by providing age-appropriate content and tailored interactions (Liu and Hao, 2024a, 2024b; Hao *et al.,* 2024a, 2024b). Metaverse travel offers various formats, including AR, VR, mixed reality, interactive screens, and mobile devices, which allow users to choose the formats that best fit their technological capabilities and preferences (Liang *et al.,* 2023). Avatars integrated with generative AI via APIs deliver dynamic interactions with real-time responses, allowing for personalized and engaging travel experiences (Kang and Kim, 2020). Although studies (Wojciechowski *et al.*, 2021) explore immersive technology in the healthcare context, research is also conducted on the adoption and impact of metaverse travel for older adults (Kim and Hall, 2023). Further exploration is required to understand how this demographic interacts with immersive technologies.

Virtual Engagement

Virtual engagement is a critical research area in digital tourism and hospitality. It focuses on users' interactive involvement in virtual travel experiences (Hao, 2020) and encompasses engagement with digital platforms, virtual activities, avatars, and online communities and environments (Huang and Choi, 2019). Virtual engagement is either multidimensional, involving cognitive, emotional, and behavioral aspects, or unidimensional, highlighting observable digital behaviors (Taheri *et al.,* 2014). Emotion-focused engagement prioritizes emotional connections and positive experiences, enhancing satisfaction and the intention to revisit (Lin *et al.*, 2019). Meanwhile, knowledge-focused engagement emphasizes educational content, enriching the cognitive value and deepening the understanding of the subject matter to influence perceptions of authenticity and trust (Rather *et al.*, 2019).

Virtual engagement improves the quality of virtual travel experiences (Rather, 2020), nurtures emotional connections (Lin *et al.,* 2019), and enhances satisfaction (Rasoolimanesh *et al.*, 2019). Melvin *et al.* (2020) identify seven engagement practices that users employ during virtual visits, including absorbing, interacting, and sharing information. Rather (2020) notes that virtual engagement dimensions affect user experience, shaping intentions toward virtual destinations. Rather *et al.* (2019) conclude that virtual engagement magnifies the influence of virtual place attachment and authenticity on trust, loyalty, and co-creation, underscoring its importance in digital tourism marketing.

Travel Intention

Travel intention is an individual's likelihood or plan to visit specific destinations soon (Ajzen, 1991). Understanding travel intention helps tourism marketers forecast future trends and enables destinations and tourism businesses to allocate resources effectively and customize marketing strategies (Dolnicar and Ring, 2014). However, older adults face unique challenges when traveling, including physical limitations, cognitive concerns, safety issues, and technological barriers (Chen and Shoemaker, 2014; Huang and Tsai, 2003). The rise of avatar-assisted metaverse travels addresses these challenges by allowing virtual exploration without physical or cognitive strains (Liang *et al.,* 2023). Avatars can personalize tours, reducing travel anxiety and improving familiarity (Wang and Fesenmaier, 2013). They also address safety concerns and introduce new technologies, making older adults more comfortable with digital platforms (Neuhofer *et al.*, 2015).

Travel Confidence

Travel confidence is travelers' inherent self-assurance and belief in their ability to travel (Valencia and Crouch, 2008). This confidence encapsulates their feelings of comfort, security, and preparedness as they journey to unfamiliar destinations. Several determinants, including physical health, mobility, prior travel experience, knowledge of destinations, and access to necessary resources and support, help shape this confidence. For older travelers, travel confidence is necessary, profoundly influencing their decision-making processes and the entirety of their travel experiences (Kizony *et al.*, 2020). When equipped with the confidence to navigate transportation systems, handle logistics, and adapt to new environments, older adults are more likely to travel and explore various destinations (Bosch and Gharaveis, 2017). In contrast, a lack of travel confidence can lead to hesitation, anxiety, or complete avoidance of potential travel opportunities (Valencia and Crouch, 2008).

Stress Reduction

Stress reduction is the process of minimizing the physical and psychological strain or tension experienced by individuals (Lovallo, 2016), which can be achieved through relaxation techniques, cognitive-behavioral strategies, and lifestyle changes. Stress reduction is important for older travelers as they face many challenges when they age, including health issues, mobility constraints, and cognitive changes, which can amplify the stress associated with traveling. Therefore, ensuring that older travelers have mechanisms or strategies to reduce stress can significantly enhance their overall travel experience.

Resistance to Change

Resistance to change is an individual's reluctance to adapt to changes in their environment, routines, or beliefs. This can be due to cognitive rigidity, emotional reactions, or behavioral responses to perceived threats from change (Dent and Goldberg, 1999). For older adults, resistance to change is particularly salient because of several factors. Age-related cognitive decline can make it challenging for older individuals to process new information and adapt to new routines. Additionally, older adults perceive deviations from routines as threats (Löckenhoff and Carstensen, 2004). Thus, resistance to change should be considered when introducing older adults to new technologies, experiences, or environments because their initial hesitancy can impede successful adoption.

Hypotheses Development

Based on SST, older adults' acceptance of technology is influenced by their future time perspective and the nature of the technology (Carstensen *et al.*, 2003). SST elucidates the paradoxical decisions of older adults when prioritizing life goals (Carstensen *et al.*, 2003). Owing to the decline in physical and cognitive functions, older adults often intentionally adopt goals that utilize their limited resources and disregard those incompatible with their resources. SST posits that the nature of technology, whether emotionally or functionally driven, significantly affects older adults' engagement levels. According to SST, individuals increasingly value emotional satisfaction over the acquisition of new information as they age (Kim *et al.*, 2017), implying that older adults are more likely to engage deeply with technology that offers emotional enrichment as it aligns more closely with their prioritized goal of emotional fulfillment (Bardach *et al.*, 2021). Thus, we propose the following hypothesis:

H1: Tour focus (emotion-focused VS. knowledge-focused) has varying impacts on virtual engagement. Older travelers participating in emotion-focused tours exhibit higher engagement levels.

Based on SST, older adults' tourist engagement is shaped by their perception of the future as time-limited. This perception often makes them cautious about adopting new technologies with uncertain long-term benefits. Park *et al.* (2021) reveal that future time perspective plays a significant role in older consumers' acceptance of self-service technology based on desirability and feasibility. Focusing on the presence or absence of positive psychological cues is crucial as these cues can enhance the perceived value and usability of technology for older adults (Kang and Kim, 2020; Kim *et al.*, 2023). When an avatar integrates uplifting statements and messages into its dialogue, it evokes positive emotions and fosters optimistic expectations for the future. This leads older adults to perceive a more positive future that is filled with opportunities and potential (Kim *et al.,* 2023). Thus, we propose the following hypothesis:

H2: Positive psychological cues moderate the influence of tour focus on older adult tourists' virtual engagement.

Virtual engagement shapes travelers' intentions by influencing their desire for virtual and real travel experiences. Positive travel experiences foster travel confidence and transform virtual engagement into tangible travel intentions (Valencia and Crouch, 2008). VR tours of historical sites significantly increase travel intentions by enhancing visitors' knowledge and emotional connections before the actual visit (Bibbò *et al*, 2024). Similarly, AR apps showcasing local cultural festivals allow potential tourists to visualize and plan their trips more effectively, resulting in higher travel commitment. Virtual travel immersion makes older travelers more confident in physical travel, increasing their likelihood of pursuing real travel (Teichmann, 2011).

Travel confidence is crucial for linking virtual engagement to actual travel intentions, particularly for older adults, as virtual experiences bolster confidence and ease travel anxiety. Liang *et al.* (2023) illustrate this through a metaverse virtual social center that allows older adults to interact socially while nurturing their confidence in traveling. These immersive virtual environments help older adults engage socially, access culturally diverse content, and enjoy life-like travel scenarios. This virtual center demonstrates how virtual engagement tailored to older adults enhances their travel intentions through personalization and engagement. Thus, we propose the following hypothesis:

H3: Travel confidence mediates the positive relationship between virtual engagement and travel intention among older travelers.

The pathway from virtual engagement to travel intention is influenced by various mediating factors, including stress reduction. When older travelers experience high virtual engagement levels, their stress levels are often reduced, given that positive experiences alleviate potential anxiety or uncertainties associated with travel. This, in turn, rejuvenates their travel intentions (Bibbò *et al*, 2024). The more stress-free and engaging virtual travel experiences are, the more inclined older travelers are to replicate them in real life. Thus, stress reduction serves as a crucial bridge that mediates the positive relationship between virtual engagement and travel intention. Older adults, who are often more susceptible to the stress of unfamiliar environments and travel logistics, find significant relief through virtual engagement, which, in turn, lowers barriers and encourages actual travel (Kazeminia *et al*, 2015). Therefore, we propose the following hypothesis:

H4: Stress reduction mediates the positive relationship between virtual engagement and travel intention among older travelers.

Stress reduction plays a crucial role in older adults' decision-making processes, particularly in the context of travel (Xie *et al.,* 2021). Reduced stress not only leads to greater ease of mind but also increases self-assurance in travel decisions (Liang *et al.,* 2023). Stress reduction enhances travel confidence by alleviating fear and uncertainty associated with unfamiliar travel environments (Meier *et al.,* 2020). Reduced stress makes older adults confident in their ability to travel, both virtually and physically, enabling them to approach travel enthusiastically and positively. Thus, we propose the following hypothesis:

H5: Stress reduction positively impacts travel confidence for older travelers.

Resistance to change plays a key role in the relationship between travel confidence and travel intention. While travel confidence bolsters travel intention (Chen and Shoemaker, 2014), resistance to change moderates this relationship. Specifically, even if older adults possess high travel confidence, their inherent resistance to change dampens their travel intention, as they might still prefer familiar environments and routines to new experiences. The positive effects of travel confidence on travel intention can be attenuated for those with higher levels of resistance to change. Therefore, we develop the following hypothesis:

H6: Resistance to change moderates the positive relationship between travel confidence and travel intention among older adults.

Method

Research Design

To test the theoretical model, we conduct two experiments that examine the influence of tour orientation and the role of positive psychological cues on virtual engagement. Study 1 scrutinizes four distinct facets for older adult tourists: (1) the differential impacts of emotion- or knowledge-focused tours on older travelers' engagement (H1), (2) the mediating role of travel confidence in the relationship between virtual engagement and travel intention (H3), (3) the mediating role of stress reduction in the relationship between virtual engagement and travel intention (H4), and (4) the moderating role of resistance to change in the positive relationship between travel confidence and travel intention (H5). Figure 1 illustrates the theoretical model. Meanwhile, Study 2 investigates whether positive psychological cues moderate the influence of the tour's focus on tourist engagement (H2).

{Insert Figure 1 here}

Prototype Design

By selecting Rome (Study 1) and Paris (Study 2) as distinct destinations representing diverse cultural and historical contexts, we ensured that the effects were not destination-specific. Metaverse travel prototypes were developed and refined through a collaborative and iterative process to accurately capture the respondents' perceptions. Three researchers designed scenes and scripts to create an immersive and representative experience. This draft was reviewed by a panel of ten external reviewers—six tourism professors and four experienced tour guides—who provided valuable design feedback. Their insights led to revisions, after which the Metaverse Lab in the Department of Computing at our university was commissioned to produce the prototypes. The revised prototypes were then shared with external reviewers, who, after experiencing the virtual tours, provided additional comments that prompted further refinements. The prototypes were then pretested with 35 participants to assess clarity, engagement, and destination representativeness, leading to final adjustments.

Based on the feedback from the pretesting stage, the tour was designed to be accessible and comfortable for participants. Instead of using wearable devices, which can cause dizziness or discomfort, the tour was displayed on an interactive TV screen, allowing participants to customize their travel paths while maintaining immersion and engagement. An avatar guided participants through each destination, providing explanations and showcasing video highlights. Participants verbally communicated with the avatar, which was integrated with ChatGPT 3.5 through an API and facilitated by the Discord user interface. This ensured dynamic real-time responses, thereby enhancing the virtual travel experience.

Participant Recruitment

To minimize variance arising from within-subject heterogeneity, purposive and convenience sampling methods were used to select participants. Individuals aged 60 years or older who are familiar with technology (smartphones, computers, or tablets), possess prior outbound travel experience, are proficient in English, and have basic physical mobility were targeted for the study. A US-based survey company managed the recruitment process to ensure a final sample of eligible participants through convenience sampling. Further, we balanced previous travel experiences across designated destinations to ensure comparable prior experiences and to

minimize potential biases. In Study 1, 38.6% of participants had traveled to Rome, while 61.4% had not. In Study 2, 37.8% of participants had visited Paris, while 62.2% had not (see Table I).

{Insert Table I here}

Questionnaire Design

Upon completion of the avatar-guided virtual tour, participants were required to answer a structured questionnaire. Each questionnaire included six content-related screening questions to ensure that participants were attentive to the virtual travel experience: three manipulation check questions to verify the effectiveness of experimental manipulations, three realism checks to assess participants' perceptions of realism in the virtual environment, and three attention-check questions to confirm that participants were attentive throughout the entire questionnaire.

Content-related screening questions were designed to confirm each participant's attentiveness to the virtual tour content. In Study 1, on the Roman Colosseum, participants were asked questions such as which Roman Emperor commissioned the construction of the Colosseum and the primary purpose of the Colosseum, ranging from gladiatorial contests, government offices, religious ceremonies, and market trading. In Study 2, on the Parisian Virtual Tour, participants were asked to identify which famous cathedral was mentioned and which artist was highlighted in the Montmartre section. Participants who failed the engagement criteria were excluded to ensure that only data from fully engaged individuals were included in the analysis.

Then, participants answered manipulation check questions. For emotion-focused versus knowledge-focused tour manipulation, one question was, "To what extent did the avatar-guided virtual tour emphasize emotional experiences and connections?" Participants responded on a scale of 1 ("strongly disagree") to 7 ("strongly agree"). Another question was, "How much emphasis was placed on knowledge acquisition and learning during the avatar-guided virtual tour?" This question was rated on a scale of 1 ("not at all") to 7 ("extremely much") and reverse-coded. For the positive psychological cues' manipulation check, questions included, "To what extent did the tour's messaging promote a positive outlook on future travel opportunities?" and "Did the inclusion of positive psychological cues make you feel more enthusiastic about future travel?" Participants answered on a scale of 1 ("not at all") to 7 ("extremely much").

The realism of the scenario was then assessed on a scale of 1 ("very unrealistic") to 7 ("very realistic"). Questions included "To what extent did the virtual tour feel like an authentic representation of the destination?" and "How accurately did the visual and audio elements reflect the destination's real-world environment?" Additionally, participants answered three attention-check questions to ensure attentiveness, such as "Select 'Strongly Agree' as the response to this question." Those who failed these attention checks were excluded because their inattentiveness could compromise data quality.

Participants completed scales measuring virtual engagement (Lin *et al.*, 2019), travel confidence (Lim, 2017; Valencia and Crouch, 2008), stress reduction (Yang *et al.*, 2021), travel intention (Ajzen, 1991), and resistance to change. Each item was rated on a seven-point Likert

scale (1 = “strongly disagree,” 7 = “strongly agree”). Demographic data, including age, gender, education, employment, income, marital status, and income source, along with control variables such as living conditions, health, travel frequency, technology use, and experience with metaverse travel, were collected. We used open-ended questions to collect keywords for preliminary insight into their experiences.

Study 1

Data Collection

Study 1 employed a between-subjects, single-factor experimental design. The recruitment process initially yielded 210 participants. After excluding ineligible individuals and those who did not pass the attention-check questions, the final sample comprised 202 participants (mean age = 65; range 61–79 years; 50% female; Table II). Participants were randomly assigned to one of two experimental conditions, each requiring them to engage in a 10-minute avatar-guided virtual tour of Rome, including the Colosseum (Figure 2), Vatican City, Pantheon, and Trevi Fountain, through videos.

{Insert Table II here}

{Insert Figure 2 here}

In the first condition involving 98 participants, the virtual tour was engineered to evoke an emotionally charged experience. The avatar utilized expressive and engaging language and a focus on immersive storytelling. The script was crafted to bring Rome’s history, architecture, and art to life in a vivid and relatable manner. The avatar highlighted fascinating aspects of the landmarks. The narrative included colorful anecdotes, such as the funding of the Roman Colosseum through a public toilet tax, and imaginative scenarios that invited participants to visualize themselves as Roman characters, such as gladiators.

Conversely, the second condition, with 104 participants, fostered a knowledge-focused experience. The avatar served as an informative guide, delivering factual and educational content to enhance participants’ understanding of Rome’s historical and cultural heritage. The script emphasized the architectural marvels and cultural significance of sites, emphasizing details such as construction techniques, capacity, and the various events hosted there. It also explored broader themes, such as the social structure and political power of ancient Rome, providing participants with a comprehensive educational experience.

Both conditions shared approximately 60% identical content, ensuring that core information about Rome and its landmarks was consistently presented. The remaining 40% of the script was tailored to each tour’s focus—emotional engagement in the first and factual learning in the second—allowing for a comparative analysis of the different impacts of these tour styles on participants.

Results

A T-test was conducted to assess the success of the manipulation checks. The results demonstrated that the manipulation was effective, with emotion-focused tour participants

reporting significantly higher levels of emotional experiences and connections than those in the knowledge-focused condition ($M_{emotion}$ = 5.67, SD = 1.165 vs. $M_{knowledge}$ = 4.68, SD = 1.450; F = 8.33, p < 0.001).

To test H1, we used dummy coding for tour focus (emotion-focused = 0, knowledge-focused = 1) and found significant effects on tourist engagement using an independent sample t-test (F = 19.46; P = 0.009; SD = 0.50). Emotion-focused tour participants reported higher engagement ($M_{emotion}$ = 5.61; SD = 1.112) than those on knowledge-focused tours ($M_{knowledge}$ = 5.11; SD = 1.52). A PROCESS analysis using SmartPLS4.0 with 5000 bootstraps confirmed the significant effect of emotion-focused tours on engagement, with a β of 0.50 (SD = 0.18, p = 0.01), supporting H1. This finding aligns with SST (Carstensen *et al.*, 2003) and emphasizes the importance of emotion-focused content for older adults (Gursoy *et al.,* 2022).

Travel confidence mediates the relationship between virtual engagement and travel intention (β = 0.34, SD = 0.12, p < 0.01), confirming that travel confidence significantly enhances travel intention through virtual engagement. Thus, H3 is confirmed. This finding builds upon Huang and Tsai's (2003) and Neuhofer *et al.*'s (2015) findings, highlighting the critical role of confidence-building in virtual experiences. Meanwhile, stress reduction mediates the relationship between virtual engagement and travel intention (β = 0.28, SD = 0.09, p < 0.01), supporting H4. This result is consistent with Yang *et al.*'s (2021) finding and underscores the importance of stress-free virtual environments in promoting travel planning. Stress reduction positively impacts travel confidence (β = 0.34, SD = 0.09, p < 0.01), further establishing the link between stress reduction and enhanced travel confidence. Thus, H5 is supported. Finally, resistance to change negatively moderates the relationship between travel confidence and influence travel intention (β = -0.05, SD = 0.02, p = 0.02), confirming H5. This result extends Liang *et al.*'s (2023) findings and confirms that increasing resistance to change can reduce the positive impact of travel confidence on travel intention.

The descriptive content analysis of open-ended questions revealed that participants in the emotion-focused condition used terms such as "interesting," "happy," "companion," "exciting," "engaging," "fascinating," "joyful," and "entertaining" to describe their experiences, reflecting older adults' preference for emotionally rich experiences (Carstensen *et al.,* 2003). In the knowledge-focused condition, participants frequently used terms like "informative," "educational," and "insightful" but also included negative terms like "dry" and "overwhelming." These findings support the findings of Xie *et al.* (2021) and Meier *et al.* (2020).

Study 2

Data Collection

Study 2 employed a between-subjects experimental design, with participants randomly assigned to one of four conditions: (1) an emotion-focused tour with the presence of positive psychological cues, (2) an emotion-focused tour without positive psychological cues, (3) a knowledge-focused tour with the presence of positive psychological cues, and (4) a knowledge-focused tour without positive psychological cues. Participants with positive messages related to their future travel experiences, emphasizing the benefits and exciting opportunities that lie ahead.

Participants were older travelers who met the eligibility criteria established in Study 1. The final sample comprised 278 participants (Table I). They engaged in a 10-minute avatar-guided virtual tour of Paris, including tourist destinations such as Montmartre and Notre-Dame Cathedral (Figure 3), with the addition of positive psychological cues under the designated conditions. Positive psychological cues were manipulated using specific scripts. In the experimental condition, participants were presented with a script that evoked a future-oriented and positive mindset. However, participants in the control condition did not receive this script and were not exposed to the same future-oriented positive message. Participants were invited to evaluate the effectiveness and impact of positive psychological cues by rating the extent to which the messaging intervention emphasized positive aspects and opportunities for future travel experiences.

{Insert Figure 3 here}

Results

A T-test confirmed the success of the manipulation checks, with participants in the emotion-focused condition reporting higher levels of emotional experiences than those in the knowledge-focused condition ($M_{emotion}$ = 5.59 vs. $M_{knowledge}$ = 5.09, F = 12.50, $p < 0.001$). Participants in the presence condition also perceived a greater emphasis on positive aspects than those in the absence condition ($M_{presence}$ = 5.94 vs. $M_{absence}$ = 5.37, F = 13.49, $p < 0.001$). An independent sample t-test showed that tour focus significantly affects tourist engagement (F = 11.78; $p < 0.001$), with higher engagement in the emotion-focused condition ($M_{emotion}$ = 5.85) than in the knowledge-focused condition ($M_{knowledge}$ = 5.38).

PROCESS analysis revealed that Study 2's findings for H1, H3, H4, and H5 were consistent with those of Study 1. Emotion-focused tours positively influence virtual engagement ($\beta = 0.74$, SD = 0.15, $p < 0.01$), confirming H1. Virtual engagement significantly impacts travel intention through partial mediation by travel confidence ($\beta = 0.24$, SD = 0.07, $p < 0.01$), confirming H3. Stress reduction partially mediates the relationship between virtual engagement and travel intention ($\beta = 0.20$, SD = 0.07, $p < 0.01$), confirming H4. Stress reduction positively affects travel confidence ($\beta = 0.50$, SD = 0.07, $p < 0.01$), supporting H5. Resistance to change has a negative moderating effect on the relationship between travel confidence and travel intention ($\beta = -0.04$, SD = 0.02, $p = 0.01$), confirming H6.

Unique to Study 2, we find that positive psychological cues significantly moderate the relationship between tour focus and virtual engagement ($\beta = -0.47$, SD = 0.19, $p = 0.01$), demonstrating that positive cues lessen the gap between emotion-focused and knowledge-focused tours. Thus, H2 is supported. These findings align with those of Meier *et al.* (2020) and Yang *et al.* (2021), who emphasize the value of emotional and psychological priming in enriching tourism experiences.

Our results show that participants clearly preferred emotion-focused tours, particularly when augmented by positive psychological cues. Descriptions like "thrilling," "enchanting," and "empowering" highlighted the enhanced enjoyment and engagement these cues brought to the experience, supporting studies that emphasize the power of emotional content to

significantly improve user satisfaction and interaction in virtual environments (Gursoy *et al.*, 2022; Liang *et al.*, 2023). Conversely, emotion-focused tours without psychological cues, although still positive, did not elicit a strong reaction, suggesting that the integration of these cues plays a crucial role in maximizing the emotional impact.

Meanwhile, we find that knowledge-focused tours received mixed responses. With positive psychology cues, these tours were considered "educational" and "enriching," reinforcing the findings of prior research that well-designed educational content can be engaging if it also addresses emotional needs (Neuhofer *et al.*, 2015; Huang and Tsai, 2003). However, without these cues, the same tours were considered "lackluster" and "boring," underscoring the necessity of combining informative content with elements that cater to the emotional and psychological preferences of users, especially older adults. This differentiation highlights the importance of tailored content that aligns informative and emotional elements to create compelling virtual travel experiences (Meier *et al.*, 2020).

Conclusion and Discussion

This study explores the emotional and psychological factors shaping virtual engagement among older travelers. By analyzing the interplay between tour orientation and positive psychological cues, we illustrate how virtual tours enhance travel confidence and reduce stress, aligning with SST (Carstensen *et al.*, 2003; Löckenhoff and Carstensen, 2004). This nuanced understanding fills gaps in the literature by emphasizing the necessity of emotional engagement for older travelers (Liang *et al.,* 2023; Xie *et al.,* 2021).

Two experiments are conducted to examine the influence of tour orientation (emotion-focused vs. knowledge-focused) and positive psychological cues (presence vs. absence) on virtual engagement. Study 1 explores how these factors impact engagement, whereas Study 2 analyzes their effects when moderated by the presence or absence of positive psychological cues. Both studies reinforce SST, confirming that older travelers prioritize emotional engagement because of its positive influence on travel intention through enhanced travel confidence and reduced stress. Positive psychological cues make virtual tours more emotionally engaging and encourage older travelers to travel.

The results align with those of Carstensen *et al.* (2003), who emphasize older adults' prioritization of emotional experiences. Gursoy *et al.* (2022) and Liang *et al.* (2023) focus on informational aspects and underscore the potential for virtual tours to shape travel behavior. However, our findings emphasize the importance of emotional engagement in fostering travel confidence and reducing stress. Huang and Tsai (2003) and Neuhofer *et al.* (2015) highlight the accessibility and cognitive benefits of virtual travel, while we highlight the importance of emotional resonance.

Theoretical Implications

By exploring how SST shapes older individuals' inclinations and perceptions toward digital tourism platforms, we gain a nuanced understanding of age-driven motivational shifts and their implications for technology engagement (Carstensen *et al.*, 2003). This exploration elucidates the interplay between older individuals' emotional priorities, their perceptions of future time, and their ensuing engagement with virtual travel platforms, thus offering a comprehensive view of the aging process in the context of digital tourism (Kang and Kim, 2020).

Our research further illuminates the decision-making intricacies of older travelers by examining the influence of tour orientation on their attitudes and behaviors. By contrasting emotion-centric tours with knowledge-oriented ones, we identify the differential impacts of these orientations on older travelers' engagement (Gilbert and Forney, 2015). This revelation provides a detailed perspective on how older individuals' choices and engagements are influenced by the tour's thematic focus (Xie *et al.*, 2021).

This study explores the moderating effects of conversational dynamics and emotional displays within virtual tour experiences tailored for older individuals (Kim *et al.*, 2023). By assessing the impact of these elements on user engagement, we contribute to the ongoing discussion on interaction design principles optimized for older travelers. Insights into how conversational styles and emotional cues influence older individuals' virtual engagements can guide the development of intuitive interfaces that encourage active participation and emotional resonance, ensuring a comprehensive virtual travel experience (Lin *et al.*, 2019).

Lastly, by investigating older travelers' perceptions and experiences within avatar-guided virtual tours, this research enhances the burgeoning field of virtual travel. As the importance of virtual tourism grows, understanding the factors that influence user experiences becomes crucial. Our findings offer actionable insights for the design and implementation of virtual tours that engage older travelers, thus improving their overall well-being and inspiring their travel ambitions (Huang and Tsai, 2003). Ultimately, this research charts a course toward a more inclusive and immersive virtual tourism landscape, advocating for older travelers to enjoy the full range of benefits offered by virtual travel adventures, thereby enriching the dialogue on digital engagement and inclusivity in tourism (Gursoy *et al.*, 2022).

Practical Implications

Our findings offer insights for tourism professionals, including tour operators, travel agencies, and destination marketing organizations. They must make their products and marketing strategies more appealing to older adults by focusing on creating virtual tours that evoke emotional responses. The emphasis on emotional engagement over informational content suggests that incorporating storytelling elements highlighting the emotional and experiential aspects of destinations can make virtual tours more appealing to older audiences.

This study highlights the importance of technology in enhancing travel experiences for older adults. Thus, technology innovators and developers specializing in VR, AR, and other immersive technologies are encouraged to develop platforms and applications catering to the preferences and needs of older travelers. The findings suggest a market opportunity to develop customizable avatars that offer personalized tour experiences, emphasizing the need for innovation in avatar realism, conversational dynamics, and emotional displays.

Policymakers and advocates of digital inclusivity could also benefit from our findings. Our findings underscore the necessity of making digital tourism platforms accessible and user-friendly for older adults. Initiatives promoting digital literacy among this demographic are essential to ensure that they possess the skills and confidence required to engage with metaverse travel experiences. Moreover, policies encouraging the development of accessible and inclusive digital tourism products can ensure the equitable distribution of metaverse travel benefits.

Limitations and Future Research

This study uses a narrow sample size, which affects generalizability across different age groups and cultures. Future research should broaden the demographics and explore more diverse hospitality tasks to understand the versatility of avatars. Additionally, future research should compare the "young-old" (aged 60–74) and "old-old" (aged 75 and above), refining our understanding of how older adults engage with technology-based services. Another limitation involves the avatar design and movement. Research into advanced animations and interactivity could show how these features impact older adults' engagement. This study's controlled environment does not capture real-world complexities. Field experiments in natural settings provide richer data on how older adults interact with avatar-guided tours. A longitudinal design uncovers the long-term effects on older adults' attitudes toward technology and travel. This knowledge could enhance strategies for improving technological engagement and travel experiences for older travelers over time. Lastly, future studies should conduct comprehensive qualitative investigations to uncover the underlying psychological mechanisms at play.

References

Agnihotri, A., Bhattacharya, S., Sakka, G., and Vrontis, D. (2024), "Driving metaverse adoption in the hospitality industry: an upper echelon perspective", *International Journal of Contemporary Hospitality Management*, Vol. ahead-of-print No. ahead-of-print.. DOI: 10.1108/IJCHM-10-2023-1585.

Ajzen, I. (1991), "The theory of planned behavior", *Organizational Behavior and Human Decision Processes*, Vol. 50, No. 2, pp.179–211. DOI: 10.1016/0749-5978(91)90020-T.

Ashton, M., Filimonau, V., and Tuomi, A. (2024), "How the Metaverse can add new layers of hospitality services: a perspective of senior industry practitioners", *International Journal of Contemporary Hospitality Management*, Vol. ahead-of-print No. ahead-of-print.. DOI: 10.1108/IJCHM-08-2023-1294,

Bardach, S.H., Rhodus, E.K., Parsons, K., Gibson, A.K. (2021), "Older adults' adaptations to the call for social distancing and use of technology: insights from socioemotional selectivity theory and lived experiences", *Journal of Applied Gerontology: the Official Journal of the Southern Gerontological Society*, Vol. 40, No. 8, pp.814–817. DOI: 10.1177/0733464821996864.

Bibbò, L., Bramanti, A., Sharma, J., & Cotroneo, F. (2024). AR Platform for Indoor Navigation: New Potential Approach Extensible to Older People with Cognitive Impairment. *BioMedInformatics, 4*(3), 1589-1619.

Bosch, S.J. and Gharaveis, A. (2017), "Flying solo: a review of the literature on wayfinding for older adults experiencing visual or cognitive decline", *Applied Ergonomics*, Vol. 58, pp.327–333. DOI: 10.1016/j.apergo.2016.07.010.

Buhalis, D., Leung, D., and Lin, M. (2023), "Metaverse as a disruptive technology revolutionising tourism management and marketing", *Tourism Management*, Vol. 97, p.104724. DOI: 10.1016/j.tourman.2023.104724.

Carstensen, L.L., Fung, H.H., and Charles, S.T. (2003), "Socioemotional selectivity theory and the regulation of emotion in the second half of life", *Motivation and Emotion*, Vol. 27, No. 2, pp.103–123. DOI: 10.1023/A:1024569803230.

Chen, S.C. and Shoemaker, S. (2014), "Age and cohort effects: the American senior tourism market", *Annals of Tourism Research*, Vol. 48, pp.58–75. DOI: 10.1016/j.annals.2014.05.007.

Chen, Z. (2024), "Beyond boundaries: exploring the metaverse in tourism", *International Journal of Contemporary Hospitality Management*. DOI: 10.1108/IJCHM-06-2022-0728.

Cheung, M.L., Leung, W.K.S., Chang, L.M.K., Aw, E.C.-X., and Wong, R.Y.M. (2024), "Immersive time in the metaverse and visits to the physical world: why not both? A holistic customer engagement framework", *International Journal of Contemporary Hospitality Management*, Vol. ahead-of-print No. ahead-of-print.. DOI: 10.1108/IJCHM-07-2023-0999.

Dent, E.B. and Goldberg, S.G. (1999), "Challenging 'resistance to change',", *The Journal of Applied Behavioral Science*, Vol. 35, No. 1, pp.25–41. DOI: 10.1177/0021886399351003.

Dolnicar, S. and Ring, A. (2014), "Tourism marketing research: past, present and future", *Annals of Tourism Research,* Vol. 47, pp.31–47. DOI: 10.1016/j.annals.2014.03.008.

El-Said, O. and Aziz, H. (2022), "Virtual tours a means to an end: an analysis of virtual tours' role in tourism recovery post COVID-19", *Journal of Travel Research,* Vol. 61, No. 3, pp.528–548. DOI: 10.1177/0047287521997567.

Gilbert, R.L. and Forney, A. (2015), "Can avatars pass the Turing test? intelligent agent perception in a 3D virtual environment", *International Journal of Human-Computer Studies*, Vol. 73, pp.30–36. DOI: 10.1016/j.ijhcs.2014.08.001.

Go, H. and Kang, M. (2023), "Metaverse tourism for sustainable tourism development: tourism agenda 2030", *Tourism Review*, Vol. 78, No. 2, pp.381–394. DOI: 10.1108/TR-02-2022-0102.

Gursoy, D., Malodia, S., and Dhir, A. (2022), "The metaverse in the hospitality and tourism industry: an overview of current trends and future research directions", *Journal of Hospitality Marketing and Management*, Vol. 31, No. 5, pp.527–534. DOI: 10.1080/19368623.2022.2072504.

Hao, F. (2020), "The landscape of customer engagement in hospitality and tourism: a systematic review", *International Journal of Contemporary Hospitality Management*, Vol. 32, No. 5, pp.1837–1860. DOI: 10.1108/IJCHM-09-2019-0765.

Hao, F., Aman, A.M., and Zhang, C. (2024a), "What is beautiful is good: attractive avatars for healthier dining and satisfaction", *International Journal of Contemporary*

Hospitality Management, Vol. ahead-of-print No. ahead-of-print.. DOI: 10.1108/IJCHM-09-2023-1490.

Hao, F., Ng, W., Aman, A. M., & Zhang, C. (2024b). Technology for sustainability: The impact of avatar-led green training on OCBE and green creativity. *International Journal of Contemporary Hospitality Management*. https://doi.org/10.1108/IJCHM-12-2023-1927

Huang, L. and Tsai, H.T. (2003), "The study of senior traveler behavior in Taiwan", *Tourism Management*, Vol. 24, No. 5, pp.561–574. DOI: 10.1016/S0261-5177(03)00008-6.

Huang, S. and Choi, H.S.C. (2019), "Developing and validating a multidimensional tourist engagement scale (TES)", *The Service Industries Journal*, Vol. 39, No. 7–8 Nos, pp.469–497. DOI: 10.1080/02642069.2019.1576641.

Johnson, A. and Lee, B. (2023), "Efficacy of virtual reality in physical therapy for older adults with chronic pain", *Journal of Pain Management,* Vol. 46, No. 2, pp.112–120. DOI: 10.1016/j.pain.2023.01.007.

Kang, H. and Kim, H.K. (2020), "My avatar and the affirmed self: psychological and persuasive implications of avatar customization", *Computers in Human Behavior,* Vol. 112, p.106446. DOI: 10.1016/j.chb.2020.106446.

Kazeminia, A., Del Chiappa, G., & Jafari, J. (2015). Seniors' travel constraints and their coping strategies. *Journal of Travel Research*, *54*(1), 80-93. DOI: 10.1177/0047287513506290

Kim, D.Y., Lee, H.K., and Chung, K. (2023), "Avatar-mediated experience in the metaverse: the impact of avatar realism on user-avatar relationship", *Journal of Retailing and Consumer Services*, Vol. 73, p.103382. DOI: 10.1016/j.jretconser.2023.103382.

Kim, J. and Hall, C.M. (2023), "Older adults and the adoption of immersive technologies in tourism: towards a conceptual framework for metaverse travel engagement", *Tourism Review*, Vol. 78, No. 3, pp.415–429.

Kim, J.J., Ahn, Y., and Kim, I. (2017), "The effect of older adults' age identity on attitude toward online travel websites and e-loyalty", *International Journal of Contemporary Hospitality Management*, Vol. 29, No. 11, pp.2921–2940. DOI: 10.1108/IJCHM-04-2016-0232.

Kizony, R., Schreuer, N., Rotenberg, S., Shach-Pinsly, D., Sinoff, G., and Plaut, P. (2020), "Participation in out-of-home activities among older adults: the role of mobility, attitudes and travel behaviors", *Journal of Transport and Health*, Vol. 17, p.100846. DOI: 10.1016/j.jth.2020.100846.

Leonardi, C., Mennecozzi, C., Not, E., Pianesi, F., and Zancanaro, M. (2008), "Designing a familiar technology for elderly people", *Gerontechnology*, Vol. 7, No. 2. DOI: 10.4017/gt.2008.07.02.088.00.

Liang, H., Li, J., Wang, Y., Pan, J., Zhang, Y., and Dong, X. (2023), "Metaverse virtual social center for elderly communication in time of social distancing ", *Virtual Reality & Intelligent Hardware*, Vol. 5, No. 1, pp.68–80. DOI: 10.1016/j.vrih.2022.07.007.

Lim, W.M. (2017), "Restoring tourist confidence and travel intentions after disasters: some insights from a rejoinder to a series of unfortunate events in Malaysian tourism", *Current Issues in Tourism*, Vol. 20, No. 1, pp.38–42. DOI: 10.1080/13683500.2015.1073228.

Lin, H., Zhang, M., Gursoy, D., and Fu, X. (2019), "Impact of tourist-to-tourist interaction on tourism experience: the mediating role of cohesion and intimacy", *Annals of Tourism Research*, Vol. 76, pp.153–167. DOI: 10.1016/j.annals.2019.03.009.

Liu, S. and Hao, F. (2024a), "Engaging with avatar in virtual regenerative tourism", *Journal of Travel and Tourism Marketing*, Vol. 41, No. 6, pp.864–879. DOI: 10.1080/10548408.2024.2350053.

Liu, S. and Hao, F. (2024b), "Metaverse and regenerative tourism: the role of avatars in promoting sustainable practices", *Asia Pacific Journal of Tourism Research*, Vol. 29, No. 7, pp.869–884. DOI: 10.1080/10941665.2024.2350401.

Löckenhoff, C.E. and Carstensen, L.L. (2004), "Socioemotional selectivity theory, aging, and health: the increasingly delicate balance between regulating emotions and making tough choices", *Journal of Personality,* Vol. 72, No. 6, pp.1395–1424. DOI: 10.1111/j.1467-6494.2004.00301.x.

Lovallo, W. (2016), "Stress and health: biological and psychological interactions"*, Stress and Health: Biological and Psychological Interactions (3rd ed.)*, SAGE Publications, Thousand Oaks.

Lu, J., Xiao, X., Xu, Z., Wang, C., Zhang, M., and Zhou, Y. (2022), "The potential of virtual tourism in the recovery of tourism industry during the COVID-19 pandemic", *Current Issues in Tourism*, Vol. 25, No. 3, pp.441–457. DOI: 10.1080/13683500.2021.1959526.

Meier, C., Saorín, J.L., Bonnet de León, A., Guerrero Cobos, A. (2020), "Using the Roblox video game engine for creating virtual tours and learning about the sculptural Heritage", *International Journal of Emerging Technologies in Learning*, Vol. 15, No. 20, pp.268–280. DOI: 10.3991/ijet.v15i20.16535.

Melvin, J., Winklhofer, H., and McCabe, S. (2020), "Creating joint experiences – families engaging with a heritage site", *Tourism Management*, Vol. 78, p.104038. DOI: 10.1016/j.tourman.2019.104038.

Miao, L., Yang, F.X., Hu, J., Wang, K.Y., and Zhang, Q. (2024), "Sense of place of tourism destinations in a metaverse paradigm", *Tourism Management*, Vol. 105, p.104958. DOI: 10.1016/j.tourman.2024.104958.

The National Science and Technology Council. (2019), "Emerging technologies to support aging population", Available at: https://trumpwhitehouse.archives.gov/wp-content/uploads/2019/03/Emerging-Tech-to-Support-Aging-2019.pdf (Accessed May 2024).

Neuhofer, B., Buhalis, D., and Ladkin, A. (2015), "Technology as a catalyst of change: enablers and barriers of the tourist experience and their consequences", *Information*

and Communication Technologies in Tourism 2015, Cham: Springer International Publishing, pp.789–802.

Park, J., Kim, D., and Hyun, H. (2021), "'Understanding self-service technology adoption by "older' consumers", *Journal of Services Marketing*, Vol. 35, No. 1, pp.78–97. DOI: 10.1108/JSM-10-2019-0420.

Pew Research Center. (2023), *"Technology Use Among Seniors"*, Available at: https://www.pewresearch.org (Accessed May 2024).

Rasoolimanesh, S.M., Md Noor, S., Schuberth, F., Jaafar, M. (2019), "Investigating the effects of tourist engagement on satisfaction and loyalty", *The Service Industries Journal*, Vol. 39, Nos. 7–8, pp.559–574. DOI: 10.1080/02642069.2019.1570152.

Rather, R.A. (2020), "Customer experience and engagement in tourism destinations: the experiential marketing perspective", *Journal of Travel and Tourism Marketing*, Vol. 37, No. 1, pp.15–32. DOI: 10.1080/10548408.2019.1686101.

Rather, R.A., Hollebeek, L.D., and Islam, J.U. (2019), "Tourism-based customer engagement: the construct, antecedents, and consequences", *The Service Industries Journal*, Vol. 39, Nos. 7–8, pp.519–540. DOI: 10.1080/02642069.2019.1570154.

Shin, S., Koo, C., Kim, J., and Gursoy, D. (2024), "Effects of metaverse experience on behavioral intention of visitors: moderating role of similarity between virtual and real experience", *International Journal of Contemporary Hospitality Management*. DOI: 10.1108/IJCHM-10-2023-1567.

Taheri, B., Jafari, A., and O'Gorman, K. (2014), "Keeping your audience: presenting a visitor engagement scale", *Tourism Management*, Vol. 42, pp.321–329. DOI: 10.1016/j.tourman.2013.12.011.

Teichmann, K. (2011), "Expertise, experience and self-confidence in consumers' travel information search", *International Journal of Culture, Tourism and Hospitality Research*, Vol. 5, No. 2, pp.184–194. DOI: 10.1108/17506181111139591.

United Nations. (2020), "World population ageing 2020 highlights", United Nations Department of Economic and Social Affairs Population Division, Available at: https://www.un.org/development/desa/pd/news/world-population-ageing-2020-highlights (Accessed May 2024).

Valencia, J. and Crouch, G.I. (2008), "Travel behavior in troubled times: the role of consumer self-confidence", *Journal of Travel and Tourism Marketing*, Vol. 25, No. 1, pp.25–42. DOI: 10.1080/10548400802164871.

Viñals, M.J., Gilabert-Sansalvador, L., Sanasaryan, A., Teruel-Serrano, M.-D., and Darés, M. (2021), "Online synchronous model of interpretive sustainable guiding in heritage sites: the avatar tourist visit", *Sustainability*, Vol. 13, No. 13, p.7179. DOI: 10.3390/su13137179.

Wang, D. and Fesenmaier, D. (2013), "Transforming the travel experience: the use of smartphones for travel", *Information and Communication Technologies in Tourism 2013*, Berlin/Heidelberg: Springer, pp.58–69.

Wojciechowski, A., Wiśniewska, A., Pyszora, A., Liberacka-Dwojak, M., and Juszczyk, K. (2021), "Virtual reality immersive environments for motor and cognitive training of elderly people–a scoping review", *Human Technology*, Vol. 17, No. 2, pp.145–163.

World Health Organization. (2023). National programmes for age-friendly cities and communities: A guide. World Health Organization. https://www.who.int/publications/i/item/9789240066335

Xie, L., Guan, X., Liu, B., and Huan, T.C.T.C. (2021), "The antecedents and consequences of the co-creation experience in virtual tourist communities: from the perspective of social capital in virtual space", *Journal of Hospitality and Tourism Management*, Vol. 48, No. 3, pp.492–499. DOI: 10.1016/j.jhtm.2021.08.006.

Yang, T., Lai, I.K.W., Fan, Z.B., and Mo, Q.M. (2021), "The impact of a 360° virtual tour on the reduction of psychological stress caused by COVID-19", *Technology in Society*, Vol. 64, p.101514. DOI: 10.1016/j.techsoc.2020.101514.

Zaman, M., Hasan, P.R., Vo-Thanh, T., Shams, R., Rahman, M., and Jasim, K.M. (2024), "Adopting the metaverse in the luxury hotel business: A cost–benefit perspective", *International Journal of Contemporary Hospitality Management*, Vol. ahead-of-print No. ahead-of-print.. DOI: 10.1108/IJCHM-08-2023-1265.

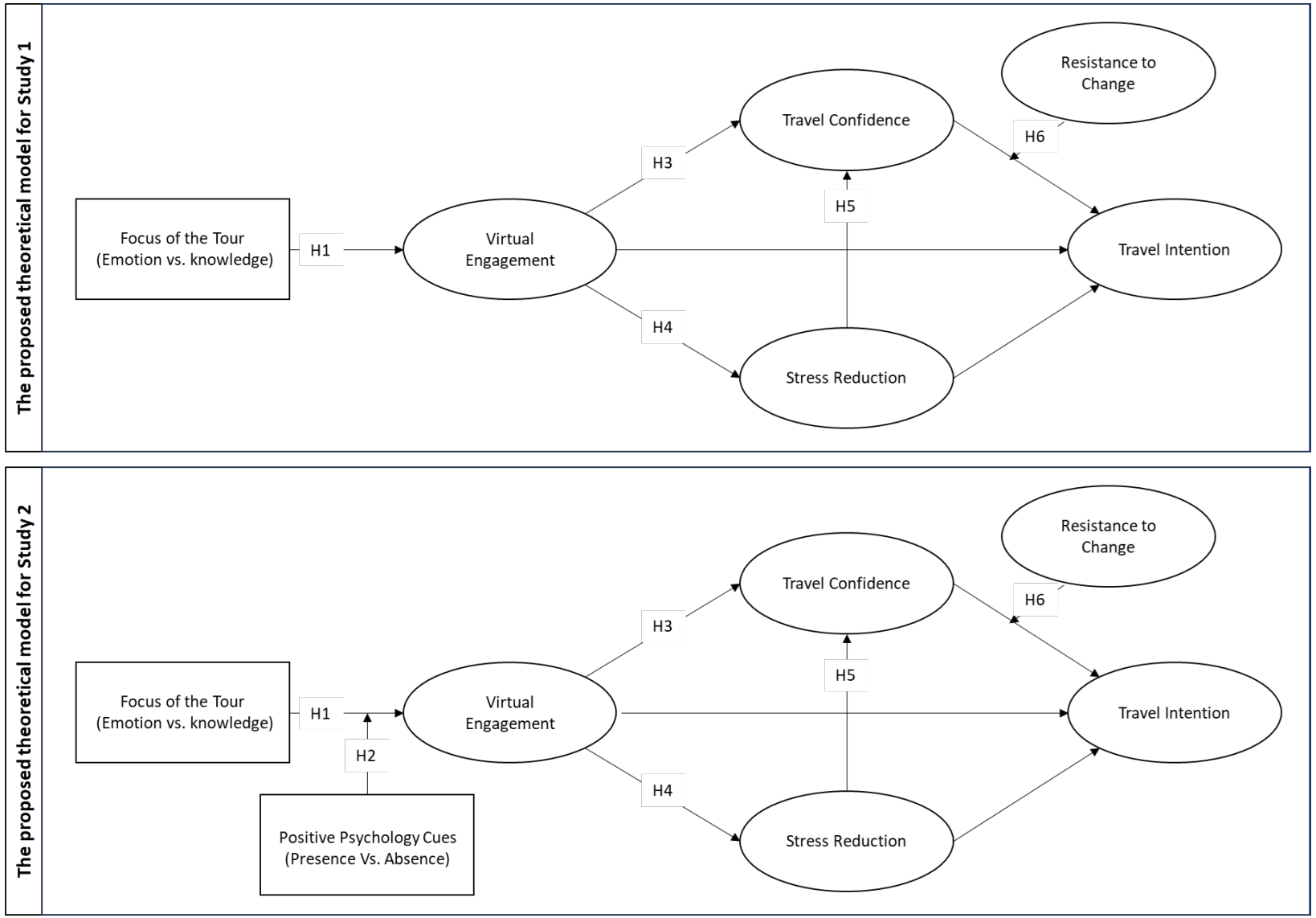

Figure 1. The proposed theoretical models (Authors own creation)

Figure 2. The metaverse travel prototype for study 1 (Authors own creation)

Figure 3. The metaverse travel prototype for study 1 (Authors own creation)