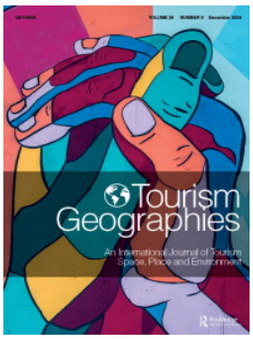

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RESEARCH ARTICLE

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Sensory experience of visitors with hearing impairment on a rural island destination

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ABSTRACT

This study aims to examine the sensory experiences of visitors with hearing impairment (HI) in the context of a rural destination. A series of field visits have been run over four seasons at the island of Yim Tin Tsai (YTT) in Hong Kong, involving 85 participants without impairment and 78 participants with HI. Spatial mapping and focus group discussions have been employed to perceive their sensory impressions and appraisals of YTT. The empirical data collected offers opportunities for in-depth examination of multisensory experiences of visitors with HI from a spatial perspective, as well as any differences with participants without impairment regarding their sensory perceptions. The paper concludes by emphasizing the importance of offering a vivid multisensory environment by preserving and utilizing the natural landscape, such that visitors with HI can be left with a fulfilling and rewarding experience.

HIGHLIGHTS

- Experiences of visitors with HI are mainly made up by vision and smell.
- Visitors with hearing impairment exhibit a stronger connection to natural settings.
- Experiences for visitors with hearing impairment should involve diverse sensations.
- Importance should be placed on natural features in rural tourism planning.

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Sensory experience; tourism experience; hearing impairment; rural destination; natural landscape; accessible tourism

1. Introduction

An estimated 1.3 billion people worldwide, or 16% of the world population, experience significant disability (World Health Organization, 2023). As the population ages around the world, the proportion of individuals with impairment also increases, which implies

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that more attention should be paid to their needs (Hernández-Sales & Sánchez, 2023; Kirk-Wade, 2023). This applies to the tourism context as well, as more older people and individuals with impairment are actively participating in tourism activities (Qiao et al., 2022). The needs of those with challenges in experiencing tourist destinations should therefore be considered. It is often conceived that visitors with sensory or other disabilities cannot fully experience destinations (Richards et al., 2010). However, studies such as Dann and Dann (2012) and Small et al. (2012) show that such visitors can still enjoy leisure traveling by maximizing the utilization of different senses. Moreover, by catering to the needs of individuals with sensory impairment, the tourism industry can tap into a significant market segment and enhance its own reputation for inclusivity. The utilization of multiple senses can play an essential role in facilitating individuals with sensory impairment in traveling and experiencing the world, reducing the disparity in tourism opportunities between them and those without disabilities (Darcy et al., 2020; Small & Darcy, 2011).

The existing literature has mainly focused on discussing the sensory experiences of people with reduced mobility or visual impairment, with those of individuals with hearing impairment being under-researched (Jensen et al., 2023), which is the research gap this study seeks to fill in. As such, the major objective of this study is to examine the sensory experience creation process of visitors with hearing impairment (hereafter referred to as 'HIs') at a rural destination, namely Yim Tin Tsai (YTT) in Hong Kong. This is done by juxtaposing the experiences of HIs with those without diagnosed hearing impairment and observing any notable differences between the two groups, which are analyzed by the five senses, which are vision, sound, taste, smell, and touch. More specifically, this study delves into the importance of non-auditory senses as pathways for HIs to experience rural destinations.

2. Literature review

2.1. Sensory experiences of visitors with impairment

While very few academic publications discussing the needs of visitors with disabilities have been published before the twenty first century, the number of relevant publications has been increasing steadily since 2000 (Hernández-Sales & Sánchez, 2023; Qiao et al., 2022). These studies often mention the umbrella term 'inclusive tourism', referring to 'transformative tourism in which marginalized groups are engaged in ethical production or consumption of tourism and the sharing of its benefits' (Scheyvens & Biddulph, 2018, p. 592). While marginalized groups may include females, people with low income, ethnic minorities, and differently-abled people depending on the actual context, 'accessible tourism' usually more specifically refers to issues related to cognitive and physical challenges, as well as age (Darcy & Dickson, 2009; Scheyvens & Biddulph, 2018). For people with a disability, travel planning can involve a considerable extent of risk management, and if this can be achieved, tourism can be seen as a symbol for recovery (Yau et al., 2004). This is illustrated in Darcy (2010), which explores the preferred formats of accommodation information provision for visitors with impairment, in order to minimize their perceived risks.

Many works on accessible tourism focus on the needs and experiences of individuals with visual impairment, whose difficulties in experiencing destinations appear to be the

most obvious (e.g. Huang & Lau, 2020; Lam et al., 2020; Liu et al., 2024; Small, 2015). The challenges encountered and uses of non-visual senses by visitors with visual impairment during their travel, as well as the importance for destination managers to offer a multisensory experience in enhancing the experience and accessibility of visitors with visual impairment, are discussed in Richards et al. (2010) and Small et al. (2012). One major theme emerging from the empirical data of the two studies is the reliance of visitors with visual impairment on non-visual senses, mainly auditory and tactile, during travel. This is, in fact, at odds with the 'tourist gaze' concept proposed in Urry (1990), which asserts that many tourism experiences are fundamentally visual, reflected by the historical context of privileging the eye in Western society and visitors' habit of directing their gaze to uncommon landscapes that are not typically seen in their everyday lives (Urry & Larsen, 2011). This, in turn, explains the often ignorant attitude of the community towards the needs of visitors with visual impairment, another major theme emanating from Richards et al. (2010) and Small et al. (2012), when it is assumed that they cannot enjoy their travels due to their challenges in seeing (Small, 2015).

Qiao et al. (2023) interestingly suggest that apart from utilizing the usual senses of sound, taste, touch, and smell, imagined 'sight,' the whole body, and the beauty of a vague gaze are also constructs in completing and formulating the multisensory travel experiences of visitors with visual impairment, entailing a sensory framework that expands from the five common senses. In particular, the imagined 'sight' and vague gaze offer a novel dimension in examining the concept of the 'tourist gaze,' suggesting that it still exists in the tourism experiences of those with visual impairment, although the gaze is different from that of sighted visitors, rather than being absent. In Small's (2015) study, a blending of embodied mobility occurred between visitors with visual impairment and their sighted guides when they paired up for a tour in Italy, leading to novel perspectives in experiencing destinations sensorially for both groups. Apart from visitors with visual impairment, visitors with mobility impairment may also experience difficulties in experiencing destinations visually, as the wheelchair lowers their line of sight to around 1.2 meters, limiting the range of vision (Qiao et al., 2024). Nonetheless, there are few studies that explore the differences in visitor experiences among people with various degrees and natures of vision loss. More can also be researched on how 'vague gazes,' as introduced in Qiao et al. (2023) affect cognitive and emotional responses, as well as behavioral outcomes of visitors with visual impairment as compared with 'gazes' of sighted visitors, with respect to the sensory experience creation process that is to be discussed later in this paper.

On the other hand, few studies have looked into the sensory experiences of HIs, which arguably warrants more research (Jensen et al., 2023). Dann and Dann (2012) use a first-person narrative to dissect the non-visual sensory experiences of a deafblind visitor. While the sense of touch is most reported, variances are exhibited amongst different senses when considering levels of positive assessment and geographical locale. Chan et al. (2022a, 2022b) conducted a study on the sensory experience of HIs visiting Hong Kong Wetland Park and suggested that participants reported more positive than negative sensory experiences, the senses of vision and touch are the most prominent, and sensory experiences often involve combining stimuli of multiple senses, which has become an important factor in forming accessible environments. As Figueiredo et al. (2012) found that HIs tend to have thematic meals and participate

in gastronomy festivals and crafts workshops, the senses of taste and touch might be more relevant to them when compared with tourists with other impairments.

Other studies have focused on the intervention of sensory experiences of visitors with disabilities by highlighting various senses. Lauría's (2016) project involves the development of a multisensory guidebook for visitors with reduced mobility or visual impairment in Florence, Italy, which utilizes special visual presentation, audio commentaries, and portable tactile maps. Kim et al. (2023), Proctor (2005), and Ruiz et al. (2011) discussed the usage of visual and auditory media in developing museum tour guides for HIs. Henriques et al. (2019) found that accessibility facilities in Spanish and Portuguese geoparks were relatively sufficient for those with physical impairment but often neglected the needs of visitors with sensory impairment. Inclusive activities for the deafblind and those with visual impairment, such as tactile workshops with fossils, rocks, and minerals, are considered good initiatives to cater to their requirements (Henriques et al., 2019).

2.2. Determinants shaping rural visitor experiences

The diverse cultural and natural heritage in rural areas provides opportunities to develop tourism resources and activities that are significantly different from those in urban areas, including agritourism and other outdoor activities such as hiking and snorkeling (Agapito et al., 2016). The empirical results from Agapito et al. (2014, 2017) suggest that common sources of sensory impressions in rural destinations of southwest Portugal include visual landscape, sounds of the natural environment, the smell of air and plants, taste and smell of food and beverage, and the tactile perception of heat, wind, sand, sea, and plants. Such sensory memories are linked to affective appraisals of rural destinations, such as the calmness encapsulating them that contrasts with the stressful urban environment where visitors often reside, and positive opinions related to heritage conservation and restoration (Carneiro et al., 2015; Kastenholz, Carneiro, Marques, & Lima, 2012). Kastenholz et al. (2018) further concluded that aesthetics and education appear to be particularly linked to rural visitor experiences, which in turn induce higher levels of arousal and satisfaction, while entertainment plays a minimal role due to the relatively passive nature of rural experiences. In developing place attachment to a rural destination, scenic qualities of its physical environment, as well as positive perceptions of and active engagement with its landscape have been suggested as essential (Cardinale et al., 2016; Jepson & Sharpley, 2015). Although potential has been identified from rural tourism resources in enhancing the experience of people with sensory impairment (Agapito et al., 2014, 2017; Gomes & Eusébio, 2023), related research in the context of the experiences of HIs and framed under the sensory experience creation process is still lacking.

2.3. Theoretical framework

The key theoretical foundation of this research is grounded in the Theory of Embodied Cognition, which is rooted in philosophy and cognitive science. This theory posits that human cognitive processing is heavily influenced by bodily interactions with environmental sensory stimuli (Luo et al., 2024). This suggests that an individual's thoughts, emotions, and perceptions are significantly shaped by their sensory and

motor experiences (Jiang & Tu, 2023). There are strong correlations between an individual's sensory experiences, psychological states, and behavioral responses. While visualscape and soundscape often dominate the sensation-perception process, other senses also contribute to an understanding of restorative environments (Lv et al., 2022). The Theory of Embodied Cognition emphasizes the importance of considering the physical body and its interaction with the environment to understand the human mind, underscoring the interdependence of bodily actions and cognitive functions. In nature-based destinations, embodied senses play a crucial role in connecting natural landscapes, tourist health, and perceived well-being (e.g. Qiu et al., 2021; Wang et al., 2024).

In summary of the literature reviewed, there is a need to further probe the visitor experiences of HIs, particularly in the rural context. With HIs being people with sensory challenges, it would be fitting to examine their experiences from the perspective of sensory impressions. A theoretical framework, adapted from Kim and Fesenmaier (2017) and Agapito et al. (2013), has therefore been formulated to guide the research methodology of this study (Figure 1). It depicts the sensory experience creation process in tourism to be constituted of five stages. Environmental stimuli activate the sensory organs of humans, with such a process known as sensation (Goldstein, 2010). Such sensations are then processed and interpreted corresponding to the perception stage in the framework, from which cognitive (intellectual) and emotional (affective) responses are made (Ghosh & Sarkar, 2016; Goldstein, 2010; Kim & Fesenmaier, 2015; Yang et al., 2021). These responses are transformed into behavioral outcomes in the final stage, such as memory, attitude, satisfaction, and loyalty to the visited destination, which are crucial aspects to grasp for effective destination management (Agapito et al., 2013). Considering the theoretical underpinnings based upon the Theory of Embodied Cognition and the general theoretical discussions of human-environment interaction and sensuous geographies, the framework of the experience creation process provides a wide array of descriptions of the fundamental psychological characteristics and the

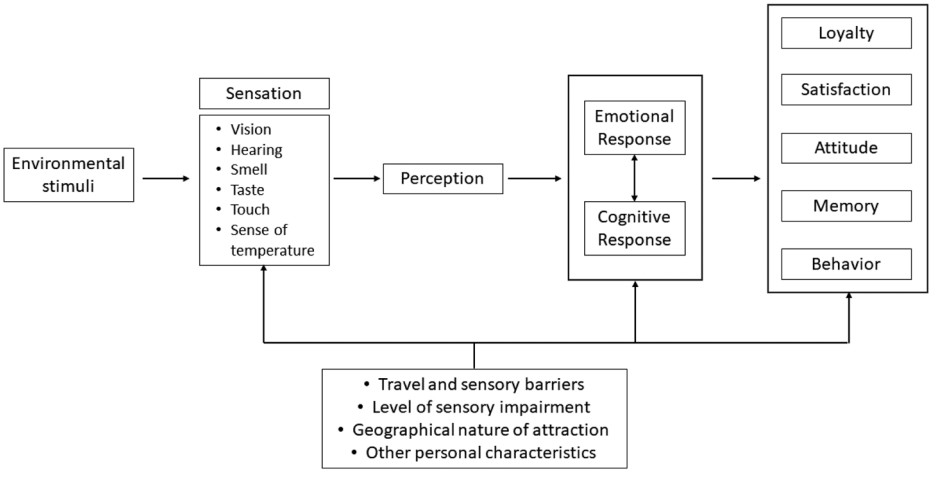

Figure 1. Theoretical framework of the sensory experience creation process in tourism (Adapted from Agapito et al., 2013; Kim & Fesenmaier, 2017; Krishna, 2012).

mechanisms responsible for translating sensation into subjective meaning and responses.

The relationship between variables in the framework has been explored in multiple relevant studies under various approaches (e.g. Agapito et al., 2017; Jepson & Sharpley, 2015; Kastenholz, Carneiro, Marques, & Lima, 2012; Kastenholz et al., 2018, 2020; Lv et al., 2020; Yang et al., 2021). The framework also introduced several exogenous variables that are of interest in this study, including travel and sensory barriers encountered during the visit (Chan & Agapito, 2022), the sensory impairment level of individuals (i.e. No known impairment or experiencing HI to a certain extent) (Richards et al., 2010; Small & Darcy, 2011) and the geographical nature of the attraction (whether urban or rural and its extent of development) (Pan & Ryan, 2009; Stylidis, 2018), which may exert influence on all stages of the sensory experience creation process (Agapito et al., 2013; Qiao et al., 2024).

3. Study setting and methodology

3.1. Study setting

YTT, a rural outlying island in Sai Kung District, was chosen as the geographical context for this study. The most distinctive features of the 0.31 square kilometer island, which is only reachable by ferry, are its Hakka culture, salt production, and Catholicism (Sai Kung Hoi Arts Festival, 2023; Yau, 2016). The island is abundant in both cultural and natural tourism resources. A heritage exhibition center, renovated from a primary school classroom, showcases exhibits and offers information on the Hakka culture and the daily lives of YTT villagers in the past (Figure 2a). The renovated St. Joseph's Chapel, a Catholic church, and the revitalized salt pans won UNESCO cultural heritage conservation awards in 2005 and 2015, respectively (Yau, 2016) (Figures 2b & c). At the same time, the mountainous terrain of the island, with much of its land and surrounding areas remaining undeveloped, offers opportunities for a short hike and to enjoy scenic views of the natural landscape. A protected mangrove and the existing natural environment invite interaction with endemic plants and animals through multiple senses. Three eating places, including a restaurant offering Western cuisine with full table service, an outdoor kiosk that offers various snacks and beverages, some of which are unique to the Hakka culture, and a traditional restaurant that serves Hakka cuisine, all provide opportunities for a unique gustatory experience on the island. Since 2019, the island has hosted an annual arts festival featuring large-scale works of art created by different artists to draw in more visitors (SKHAF, 2023) (Figure 2d). YTT is accordingly considered an ideal location for this study, as tourism authorities have placed increasing importance on developing rural tourism in YTT with the organization of the annual arts festival and installation of artworks around the island, and it offers a good blend of cultural and natural heritage, with both developed and undeveloped areas existing, allowing for a comprehensive rural tourism experience. While the existing tourism resources present opportunities for the growth of visitor activities, possible environmental destruction from over-development poses threats to sustainable tourism development on the island.

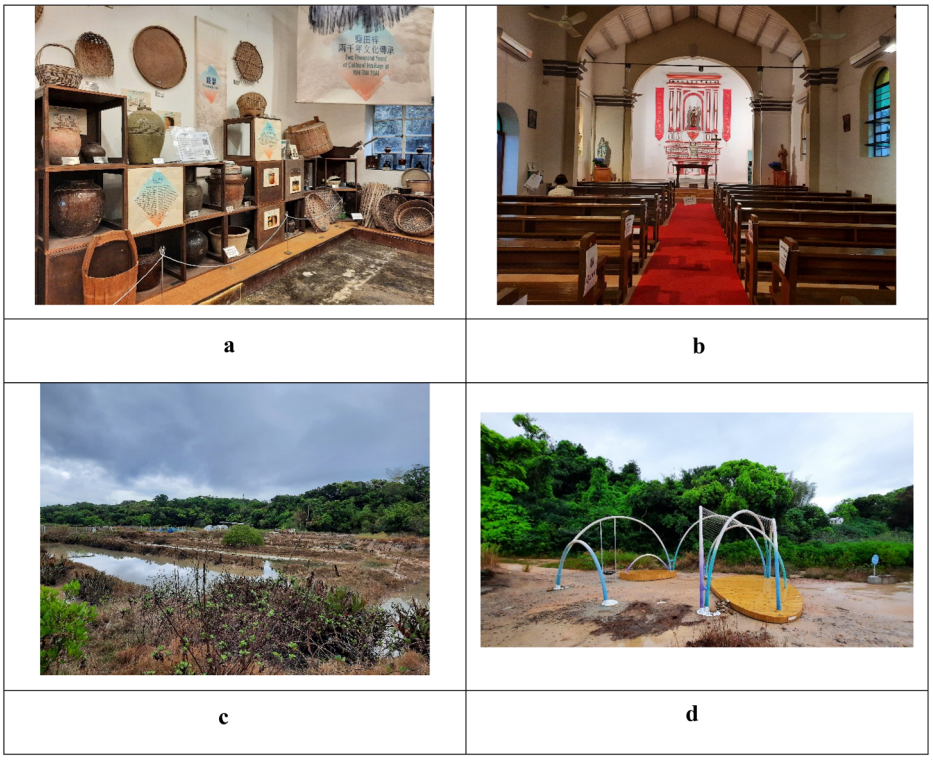

Figure 2. (a) Exhibits in the heritage exhibition center. (b) Interior of St. Joseph's Chapel. (c) The revitalized saltpans. (d)'The Salty Breeze,' one of the artworks on display in YTT.*Source*: Authors' own.

3.2. Study methods

With the recommendation from the Hong Kong Society for the Deaf (HKSOD), the collaborating organization of this study, two empirical methods have been employed for data collection to achieve methodological triangulation and minimize research bias—Spatial mapping and content analysis of focus group discussions. Maps for spatial analysis of tourism experiences are utilized (Hanna et al., 2019; Li et al., 2023) to examine the influence of the geographical nature of various attractions and locations around YTT, one of the exogenous variables proposed in the theoretical framework, taking advantage of its heterogeneity. The purposes of the focus group discussions are twofold—While data collected from the spatial mapping analysis regarding participants' sensations in YTT is triangulated, they primarily aim to investigate the various stages of the sensory experience creation process proposed in the theoretical framework in depth. The application of focus group discussions in academic works related to accessible tourism has been well demonstrated (Bender et al., 2023; Packer et al., 2007; Richards et al., 2010), which allow rich, extensive feedback from participants quickly and flexibly while offering freedom for them to discuss and rationalize their own opinions and views on their sensory experience creation process (Chin & Reich, 2006; Thomas, 2002).

The spatial mapping process begins by distributing paper maps to all participants prior to each visit, who were instructed to mark their sensory experiences at the corresponding location on the map, classified by the five senses of vision, sound, smell, taste, and touch, as well as whether the sensory experience was positive or negative with plus (+) and minus (-) signs. The annotated maps were collated and plotted into ArcGIS Pro 3.0 for the generation of spatial maps (Examples provided in Figure 3(a,b), with the complete set of maps in the **Appendix upon request**), which are specific to a particular sense, participants' impairment condition, appraisal (Positive or negative) and season, giving a total of 80 maps. The color lightness on the maps corresponds to Kernel density values (Silverman, 1986; Zheng et al., 2021) and is only comparable within each map. A lower lightness thus indicates more robust sensory experiences than other locations on YTT.

The discussions were semi-structured with a few open-ended questions and moderated by a trained research team member. A total of 32 focus group discussions in groups of 4–7 participants were conducted in Cantonese immediately after each visit, i.e. two focus groups for each visit. The questions encompassed various topics related to participants' sensory experience creation process during the visit as outlined in the theoretical framework of this study (Agapito et al., 2013; Kim & Fesenmaier, 2017), including any difficulties or barriers encountered, interactions with items or features with their five senses, most memorable places or items, and any associated feelings (Table 1). For discussions involving deaf visitors, a sign language interpreter from HKSOD was present to translate any responses made in sign language verbally and to sign any verbal comments from the moderator and other participants as needed.

The discussions were audio-recorded, transcribed, translated to English, and coded using NVivo Release 1.0 by content analysis. Content analysis is a methodical process that involves examining discussion content to find patterns, themes, and meanings, with content categories created using a set of predetermined rules that make it easier to compare data from different focus groups (Camprubí & Coromina, 2016; Stepchenkova et al., 2009). (1) All descriptions of sensory experience and (2) explicit mentioning of senses in the discussions are coded to one or more of the five senses (i.e. Vision, sound, taste, touch, and smell). A deductive coding approach has been adopted as the coding of the focus group discussion data follows five

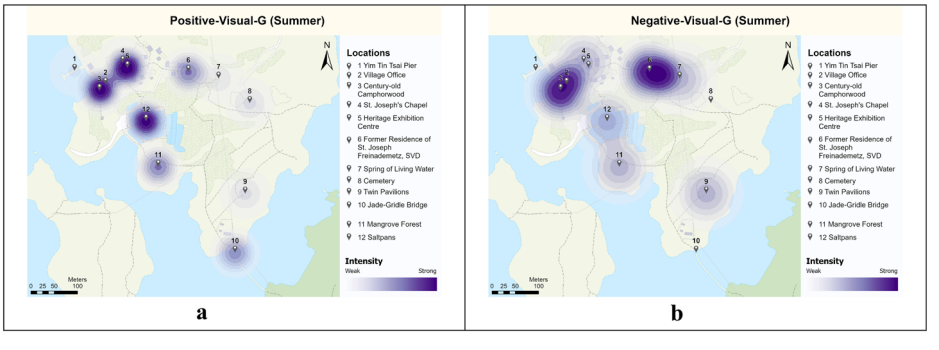

Figure 3. (a, b) Samples of spatial maps (Vision, summer season, general participants, positive [3a] and negative [3b] experiences).

Table 1. Focus group discussion questions.

Question	Corresponding item(s) in theoretical framework
• What types of difficulty have you faced during the visit? When and where?	Travel and sensory barriers
• How have you attempted to minimize or overcome the difficulties?	
• What feature or experience have you found to be the most exciting or memorable during the visit? Have you seen, heard, smelt, tasted, touched anything, or had any other feelings?	Environmental stimuli → Sensation → Perception
• What have you learned during the visit?	Cognitive response
• How has your feeling or attitude towards YTT changed after the visit?	Emotional response; attitude
• What is your most memorable part of the visit?	Memory
• Would you revisit YTT or recommend others to visit YTT?	Behavior; satisfaction; loyalty

pre-defined categories corresponding to the five senses, and it is not intended to capture all aspects in the data during coding (Azungah, 2018). This approach has been chosen as the coding is done for a specific purpose, that is, to examine the environmental stimuli, sensations, and perceptions of visitors in the theoretical framework of the sensory experience creation process. Sensory experiences expressly stated to be of another person (e.g. YouTubers) or the participant's past visit(s) to YTT are excluded from the coding process. For the sense of vision, only references to visual items seen with the keyword 'see' present are coded. The coding results are analyzed both qualitatively and quantitatively (Brochado et al., 2021; Stepchenkova & Zhan, 2013). The coded content is scrutinized word by word in search of emerging themes for each sense. To objectively portray the sensory experiences of HIs with general participants as the baseline and examine the effect of the level of sensory impairment on the sensory experience creation process described in the theoretical framework, Z-score for two population proportions and chi-square goodness of fit test are employed respectively to understand any differences in the importance of each sense and total count of sensory impressions reported between the two groups.

The study involves a total of 163 adult participants, of whom 78 had varying degrees of HI, while the remaining 85 were reportedly without hearing loss (General participants). While general participants were recruited through various sources, such as participant referrals and campus mass emails, participants with HI were recruited in collaboration with HKSOD. As a sampling frame was not available using the standard random sampling procedure, the use of volunteer sampling was considered appropriate.

All study participants were requested to do a self-guided tour of YTT, with the price of their return ferry tickets to the island being fully paid for. They also received a small monetary reimbursement to compensate for their contribution to the study. The exclusion of a tour guide during the visit is to encourage each participant to experience the island on his/her sensory level and to avoid the researchers' intervention and manipulation of such process. A total of 16 visits, four in each of the four seasons, were carried out within 11 months between June 2022 and April 2023, with 40 participants each in summer and winter, 37 in fall, and 46 in spring. This allows capturing any possible differences in sensory experiences due to perception of temperature, seasonal changes such as plants and animals on YTT, and other temporal factors influenced by climate and weather. For each season, two of the visits solely

included general participants, while the other two visits were organized exclusively for HIs. The experimental conditions of the visits are summarized in Table 2. All study participants completed a self-administered questionnaire to collect basic information on their demographic characteristics. They also completed a consent form, which agrees to their disclosure of personal and medical information and acknowledges that all personal information would be kept strictly confidential by the research team, used only for the purpose of the study, and destroyed after the study.

4. Results

4.1. Participants' demographic profile

Table 3 presents the participants' demographic profile, with the statistics suggesting a fitting distribution and variance and that individuals with diverse backgrounds are being represented in the sample. 10.3% of HIs were unsure of their level of hearing loss, whereas 66.7% of HIs reported severe hearing loss (>70 dB HL for both ears).

The demographic profiles of participants with and without HI have also been compared using Z-score. Compared to the group of general participants, participants in the HI group are significantly older, have lower educational attainment, and contain a significantly higher proportion of retired individuals and a smaller share of employed persons. General participants and HIs are also significantly more likely to have never visited YTT and visited YTT once before, respectively.

Table 2. Participants' experimental conditions of the YTT visits.

	Season	Participant disability	Number of visits
1.	Summer	None	2
2.	(June–July 2022)	HI	2
3.	Fall	None	2
4.	(October 2022)	HI	2
5.	Winter	None	2
6.	(January–February 2023)	HI	2
7.	Spring	None	2
8.	(March–April 2023)	HI	2

Table 3. Summary of participant demographics.

Gender		Employment Status	
Male	34.4%	Employed	60.1%
Female	65.6%	Unemployed	3.7%
Age Group		Student	1.2%
20–29	17.8%	Retired	26.4%
30–39	18.4%	Homemaker	7.4%
40–49	11.7%	Others / Not stated	1.2%
50–59	20.2%	No. of prior visits to YTT	
60 or above	31.9%	None	58.3%
Education Level		1	23.3%
Primary School or below	8.6%	2–3	12.3%
Middle School	16.0%	4 or above	6.1%
High School	24.5%		
Diploma/Cert/Associate's	12.3%		
Bachelor's	31.3%		
Master's or above	7.4%		

4.2. Spatial mapping

To gain a better understanding of how the geographical nature of attractions would influence HIs' sensory perceptions, visual analysis was conducted on the spatial maps (Examples provided in Figure 3(a,b), with the complete set of maps in the **Appendix upon request**), with its findings summarized by sense. The sensory impressions of HIs are also compared with general participants, who serve as a baseline case.

4.2.1. Smell

HIs had the most potent smell stimuli at the heritage exhibition center and salt pans, followed by the Spring of Living Water and mangroves, implying that the smell of the exhibits, salt, and plants may play a critical role in influencing their sensory experiences. No significant differences were found between the olfactory experiences of HIs and general participants.

4.2.2. Sound

When compared with other locations around YTT, HIs had by far the strongest auditory experiences at the Twin Pavilions, which were significantly more positive than those of general participants. Other locations with relatively intense auditory experiences include the Jade-Girdle Bridge, mangroves, and the village office. In summary, auditory experiences were dominant at locations with ample exposure to the ambient sounds of the natural environment.

4.2.3. Taste

The gustatory experiences of HIs were concentrated at the salt pans where visitors could taste salt, which was predominantly positive, as well as the village office that is close to the eating places in YTT, which tended to be negative. It is also noted that HIs' gustatory experiences were significantly weaker around the eating places when compared with the general participants.

4.2.4. Touch

The most robust tactile experiences were at the salt pans, where visitors were provided opportunities to touch the salt and kinesthetically participate in the salt-making process, mangroves, village office, and century-old camphorwood. For the latter two locations, HIs were observed to report significantly more stimulations, which were also predominantly positive, than general participants.

4.2.5. Vision

Not surprisingly, visual experiences were the most reported of all five senses by participants, regardless of impairment condition. This confirms the 'tourist gaze' concept proposed by Urry (1990) and findings from past scholarly studies that vision is essential in shaping travelers' experiences and memories. For HIs, the strongest visual experiences were found at the salt pans and St. Joseph's Chapel, where such occurrences were more negative than general participants, as well as the heritage exhibition center, where they were predominantly positive for both groups. While the spatial

distribution of visual impressions on the island was similar between the HIs and general participants, the results suggest that the former tended to associate the sense of vision with more artificial or developed elements.

4.3. Focus group discussions

The transcripts of the focus group discussions have been analyzed according to the methodology outlined in Section 3. In line with the spatial maps, the utilization of the sense of vision is the most variable with both natural and artificial features mentioned, such as the natural landscape viewed from the Twin Pavilions and Jade-Girdle Bridge, which was often evaluated as aesthetically pleasing, visual appearances of plants, animals, salt from the salt pans, artworks and other artistic decorations:

> The floating ball on Jade-Girdle Bridge was very beautiful. It was my first time seeing it. The floating ball is famous, and I took many photos of it. With the side view, you can see three mountains and the water below. Many boats were parked there, including the kayaks that we saw today. I also took some beautiful photos of the kayaks. They were just passing by, so I gave it 3 +s. (HI in spring season describing the scenery and artwork at Jade-Girdle Bridge)

> I think the most impressive scenic spot throughout the journey was the Twin Pavilions. At the beginning, we walked quite far to get there, then climbed the stairs, and finally arrived at the Pavilions. It is probably the highest point in YTT, and you have the sea view when you look down. You can see the scenery, people on kayaks in the sea, and many people taking photos. Everyone is very happy and positive. Moreover, we spent the most time there out of all the attractions, and the scenery was beautiful. This was the happiest part of the whole visit. (HI in fall season describing her visual experience at the Twin Pavilions)

Descriptions of olfactory and auditory experiences are mostly related to the natural environment. Visitors with hearing challenges mentioned the smell of fresh air, seawater, plants and cooking, as well as the sound of animals, waves from the sea, wind and voices of other people, while general participants also mentioned the sound of water flowing and leaves.

> I enjoyed the aroma of the osmanthus flowers and the smell of cooking and burning firewood near the chapel. I also liked the scent of lemongrass. (HI in winter season recalling olfactory impressions of plants and cooking)

> There are residents' houses along our way to the Spring of Living Water, and you can hear the sound of parrots. I hadn't heard the sound of these birds in nature after living in the city for so long. It felt nice to be able to hear them. (HI in fall season describing sounds of animals)

For the sense of taste, HIs mainly referred to the taste of food and beverage sold in YTT, including native chicken, sweet tofu, tea cake and chrysanthemum tea, as well as salt in the salt pans. General participants also mentioned the taste of plants in YTT, such as fennel.

> I find the salt to be a bit sweet. Salt itself is salty, but this salt has more sweetness, like adding a little sugar to the salt. (HI in winter season discussing the taste of salt in the salt pans)

Tactile stimuli are mostly linked to the salt pans (Touching of salt and hands-on experience in the salt pans), plants in YTT, and perceptions of coolness from the wind and warmth from the sunshine:

> Here, I experimented with lifting the white water pipe and saw how the water flows into another storage pool. This effect was perfect because it is important to let people experience and touch it personally. (HI in summer season discussing the hands-on experience in the salt pans)

> If I had to pick the most beautiful and impressive place among all the scenic spots, it would be the Jade-Girdle Bridge. In addition to its beautiful scenery, it is also well ventilated and relaxing along the way. Even if the sunrays were strong, the wind makes you feel refreshed and comfortable as it is completely unobstructed. (HI in fall season describing her perception of sunshine and the wind)

Interaction between different senses, when interpreted by examining statements that are coded to more than one sense, largely occurs on the Twin Pavilions and Jade-Girdle Bridge, which are relatively undeveloped locations:

> The Twin Pavilions are what I appreciate the most because you can have an overview of the entire island and the experience is very memorable. Seeing the whole island from a high vantage point, hearing the chirping of birds, and watching the eagles circling above, the visual aspect is truly amazing. You can see so many things, but the sense of touch is somewhat limited because you're observing from above. Today, the smell of the island's air is great, and no matter where you go, it feels wonderful. (HI in spring season discussing visual, auditory, tactile and olfactory impressions at the Twin Pavilions simultaneously)

In concluding the above, it appears that HIs' interactions with the artificial elements of YTT are associated with a narrower range of senses (Mainly vision and taste, and to a lesser extent, the sense of touch) when compared to the natural environment in and around YTT, resembling Pan and Ryan (2009) view. The majority of the sensory impressions reported are also positive.

Two minor themes that have also emerged from the focus group discussions are not related to direct descriptions of sensory experiences but are instead connected to barriers encountered by several participants in sensing smell and sound, with the former associated with mask-wearing (As a precaution against COVID-19, particularly in the summer, fall and winter seasons during the data collection period when Hong Kong was experiencing an outbreak of the disease and a citywide mask mandate was in effect) and the latter with HIs' difficulties in hearing:

> If the wind noise reduction was not good, then the wind at the Jade-Girdle Bridge would be stronger; it would have been difficult to hear what others were saying or the ambient sounds; we would only hear the sound of the wind. It is harder to hear in places where the wind is stronger, especially for people with HI. (HI in fall season describing her difficulties in hearing during the visit)

It should nevertheless be noted that content coded under these themes accounts for only around 2% of all HIs' sensory coding counts and is therefore considered insignificant in interpreting the overall relative importance of senses in their actual interaction with the environment of YTT.

As explained in Section 3.2, a comparison of the coding patterns between general participants and HIs has been made using a Z-score for two population proportions

(Table 4). The sense of sound was mentioned significantly less often by HIs, which was mainly compensated by vision and smell. Moreover, the general participants' absolute count of senses is significantly larger than that of HIs, χ^2 (1, $N = 531$) = 21.28, $p < .001$. These suggest that auditory impairment negatively impacts their ability to experience the destination soundscape to a considerable extent and the richness of their overall sensory experience of the landscape.

5. Discussion

5.1. Influence of hearing impairment on visitors' sensory experience

We point out in Section 4 that Visitors' relative lack of auditory experience was compensated mainly by the senses of sight and smell, and their mentioning of senses in the focus group discussions was significantly fewer than that of general participants, suggesting that HI has a negative impact on the richness of HIs' sensory experiences and the ability for them to experience destinations multi-sensorially. The senses of sound and smell are most closely related to the natural environment, followed by the sense of touch, while visual and gustatory impressions are likely associated with the more artificial or developed aspects of the destination. An analysis of feelings expressed during the discussions also suggested that HIs were more reactive to pleasing scenery, and HIs were found to evaluate their sensory impressions of YTT considerably more positively when compared with the general participants. Returning to the theoretical framework proposed in Section 2.3, this study has demonstrated that the level of sensory impairment (in the context of this study, whether the visitor has HI) has a significant, exogenous influence on the sensory experience creation process, as verified by comparative statistical data from focus group discussions and contrasting spatial maps.

Comparing the findings of this study with previous literature discussing the travel experiences of individuals with visual impairment, however, it appears that HI has a considerably smaller impact on sensory experiences in tourism, as sensory or travel barriers and sensory impressions are seldom mentioned collectively in the focus group discussions. This may be due to the use of hearing aids and that the sense of sound is not as important as vision when exploring destination environments. It appears that insufficiencies in hearing can be more easily compensated by other senses, in particular the sense of vision, resonating with Urry's (1990) 'tourist gaze' concept and the few studies examining tourism experiences of visitors with hearing loss.

Table 4. Z-score statistics (General participants vs HIs).

Code	Z-score
Smell	−1.74
Sound	2.64[a]
Taste	0.17
Touch	0.36
Vision	−1.17

[a]Statistically significant at 1% level (Two-tailed test).
Positive Z-score: Group 1 > Group 2; Negative Z-score: Group 1 < Group 2.
Group 1: General participants; Group 2: HIs.

5.2. Influence of rurality on visitors' sensory experience

When considering the geographical nature of attractions in YTT, which exhibits a wide range of variety, the findings are mainly in line with past literature in that sources of sensory impressions in rural destinations are similar (Agapito et al., 2014, 2017), and scenic qualities are viewed as important regarding rural travel experiences (Jepson & Sharpley, 2015), even when framed in a HI context. Compared with general visitors, individuals with hearing loss appeared to resonate more strongly with more primitive or natural aspects of the destination. The results also suggest that the sensory experience creation process can be affected exogenously through the geographical nature of destinations, which is substantiated by the spatial maps and mentions of the source of sensory impressions in focus group discussions.

As demonstrated by HIs' positivity in evaluating their sensory experiences and past studies (Agapito et al., 2014, 2017; Gomes & Eusébio, 2023), tourism resources in rural destinations do show potential to heighten the experiences of visitors with impairment. The rurality of destinations provides an ideal setting for the interaction of different senses and, therefore, diminishes the negative influence of HIs not being able to hear well. Nonetheless, the lack of auditory impressions, which are considered particularly essential in experiencing rural destinations sensorially (Pan & Ryan, 2009), poses a challenge in doing so.

5.3. Managerial implications

Considering the discussion above and the context of HIs' experiences in YTT and other similar rural destinations, relevant authorities should offer more vivid experiences through the provocation of multiple senses (Agapito, 2020; Chan et al., 2022b; Lv et al., 2024), especially through taking advantage of the natural environment and encouraging interactions with it using both active and passive strategies.

Actively, the heterogeneity of the physical landscape in YTT and other similar rural destinations presents an opportunity to elevate, accentuate, and capitalize on multiple senses in creating unique senses of places in various tourist spots around the destination, especially artificial attractions such as indoor exhibitions and visitor centers, where visitors associate them with a narrower range of senses (Jepson & Sharpley, 2015; Kastenholz, Carneiro & Marques, 2012; Kastenholz et al., 2020). For example, sensory cues related to taste can be offered and enhanced by taking advantage of salt locally produced in YTT to sell a wider variety of food products. In visitor centers and other indoor exhibitions, auditory, tactile, and olfactory (and possibly gustatory) effects can be replicated by playing ambient soundtracks and offering samples of natural plants found around the destination. Relevant authorities can consider organizing group activities specifically targeting visitors with HI, which shall emphasize all senses to compensate for their auditory impairments (Henriques et al., 2019). For example, activity participants can be encouraged to use their hands to feel the natural features around them and taste local food produce. As it may be particularly challenging to hold such activities on both the organizer and participant sides, financial support from the government and/or non-profit organizations may be crucial in realizing such beneficial programs.

Passively, importance should be placed on the creation of rural landscapes with a subtle and calm ambiance, which aims to evoke positive multisensory reactions from visitors (e.g. comfortable open spaces that allow consumption of food and drink, with an ample amount of plants for visitors to touch, smell and see) (Carneiro et al., 2015). Air ventilation should be encouraged to promote wind flow through careful planning of building developments, as perceptions of wind and coolness have been identified as significant sources of tactile experiences in both the focus group discussions and past studies (Agapito et al., 2014, 2017; Dias et al., 2017), and that good airflow can positively contribute to olfactory perceptions of freshness (Xiao et al., 2018). As pleasant scenery and natural features are highly valued by HIs, even more so when compared with general participants, attention should also be paid to regulating developments in rural destinations, which should assimilate well into the natural landscape and preserve its existing character such that a positive destination image can be instilled into HIs (Carneiro et al., 2015).

6. Conclusion

This study aims to contribute to the academic literature by uncovering the characteristics of HIs' sensory experiences in the context of a rural destination in Hong Kong, which little has been known so far. In line with previous studies and the 'tourist gaze' concept developed in Urry (1990), vision is the most prominent sense regarding HIs' sensory experiences. They appeared to be particularly receptive to sensory stimuli within more natural environments, which is, in turn, connected to a broader range of senses. On the other hand, auditory impressions were significantly less relevant for individuals with hearing loss, which were mainly made up by the senses of vision and smell. Managerial implications, including accentuating various senses to create a vivid multisensory environment, strengthening visitors' sensory connections with the natural environment, and preserving the existing landscape character, have been discussed. It is the authors' aspiration that through a more detailed understanding of HIs' sensations and perceptions in rural destinations, this article can facilitate destination management organizations in promoting and marketing multisensory and natural aspects of such destinations, ultimately striving towards the goal of developing 'inclusive tourism'.

6.1. Research limitations and potential areas for further study

Nonetheless, limitations do exist in the study. As stated in Section 4.1, the demographic profiles of general participants and HIs are significantly different in certain aspects. However, as HI is more likely to occur during the later stages of life (Richards et al., 2010), such variations in demographic patterns are considered acceptable. The presence of repeated visitors in the sample is noted as another potential limitation. To minimize any possible influence on the interpretation of results, the research team recruited participants who had not visited the island in the past year. Moreover, the percentage of participants who had visited YTT more than twice before was only a minority. The varied dynamics of focus group discussions may also influence the responses of discussion participants. Some might merely agree

to other participants' responses to the discussion questions or opt not to give responses at all (Onwuegbuzie et al., 2009). The frequency of mentioning senses by participants can also be affected by the interaction between them and the moderator. Constraints in understanding the study findings due to the HI of participants may exist, as dependence on the interpretation of the sign language interpreter might be necessary (Slegers et al., 2010). Data has been collected for only one site in the countryside of Hong Kong. Thus, caution must be exercised when interpreting and extrapolating the study findings to other geographical locales. Taking into account the discussion above, the following suggestions for future research are recommended: (1) Comparatively analyzing whether the sensory experiences of HIs are different amongst destinations within various geographical settings (e.g. between mountainous and coastal destinations), or expanding the study area to a larger geographical context to capture a more diverse range of sensory experience; (2) Investigating the possible effects of other internal and external factors (e.g. perceptions of the destination prior to the visit, visitors' personality, interaction with staff, volunteers and other visitors at the destination) in influencing their sensory experiences (Agapito et al., 2013; Cutler & Carmichael, 2010); and (3) Examining the influences of sensory perception on emotion, cognition, and behavioral outcomes of HIs as proposed in the theoretical framework, which have not been explored deeply in this paper.

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