



Enhancing Well-Being in Transit

– can airport settings function as restorative and health-promoting in
travellers' airport experience?

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Preface

I've been incredibly fortunate to be accepted into the Outdoor Environments for Health and Well-being programme at SLU in 2021. Through this programme, I've developed a deep appreciation for subject of Environmental Psychology, which has become my passion. My focus on airports is no coincidence. It all started in 2014 when I became a Passenger Service Agent at Edinburgh Airport in Scotland. Over the next seven years, I encountered people from all walks of life, often in moments of great stress. While airports are typically associated with holiday travel, my experiences revealed a different reality—one of chaos during holiday delays, tearful farewells, and emotional stories of weddings, honeymoons, and funerals. It's heart-breaking to be stranded in one part of the world while someone you deeply care about is in another. These experiences shaped my perception of airport environments and fuelled my interest in exploring their often-overlooked settings. Through this study, I sought to answer the question: Should airports be seen merely as transit hubs, or could they play a greater role in our travel experiences?

Though my study is modest, I hope it sparks inspiration for future research and contributes to making airports more restorative spaces. I also aspire to expand this research someday and witness the impact of airport restoration efforts on traveller well-being. This thesis aims to clearly demonstrate the significance of airport environments and their design in shaping traveller experiences. While this project marks the completion of my degree, I am eager about future research opportunities that combine my two passions: Environmental Psychology and Tourism.

Abstract

Globally, around 40,000 airports aim to efficiently guide passengers through essential functions like ticketing, check-in, and security while providing amenities such as retail stores and restaurants. Although one can argue that adding health-focused, biophilic elements could make airports more distinctive and culturally relevant, many remain standardised and lack uniqueness, resulting in a "placeless" feel. Integrating local values and green spaces could address this, yet research on these elements' impact on traveller satisfaction is limited.

This quantitative study surveyed 100 recent air travellers to explore how airport design can enhance well-being and increase restoration. The results reveal that travellers' value social and dining opportunities, with restaurants, cafes, airport lounges, and quiet zones rated as the most restorative spaces. Additionally, 61.5% of participants preferred outdoor areas for relaxation over indoor spaces. In addition, respondents also expressed a desire for more green spaces and seating options.

Thus, the results of this study suggest that by prioritising opportunities for social interactions, comfort, and implementing biophilic design, airports could create more welcoming and restorative environments that enhance travellers' airport experience.

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Glossary

Landscape – as defined by the European Landscape Convention, it is “a zone or area as perceived by local people or visitors, whose visual features and character are the result of the action of natural and/or cultural (that is, human) factors” (Art. 1). Current definitions of landscape also need to be refined, keeping in mind that people experience landscape via all of their senses (Abraham, 2010).

Biophilic Design – is an architectural approach aimed at fostering a closer connection between building occupants and the natural environment. Buildings designed with biophilic principles include features such as natural lighting, ventilation, and elements of the landscape, all of which contribute to creating a healthier and more productive living and working space.

Green spaces – are areas intentionally designed to incorporate natural elements, such as indoor gardens, living walls, plant displays, or landscaped outdoor sections. At airports, examples of such areas might include seating surrounded by greenery, pathways through indoor gardens, or views of landscaped areas, providing passengers with a refreshing break from the usual airport atmosphere.

I. Introduction

1.1. Background of the study

Travelling by air can often be stressful, with challenges such as navigating busy airports, dealing with crowded terminals, and enduring loud announcements. The increasing global demand for air travel highlights the need to consider how airport environments impact passenger stress and satisfaction. The International Air Transport Association (IATA) predicts that global passenger traffic is expected to reach 8.2 billion passengers by 2037, driven by changing travel habits (2019). Given the inherently hectic nature of airports, one can argue that these environments should address the human need for restoration and stress relief. In fact, stress affects passengers long before they arrive at the airport (Priority Pass, n.d.). To alleviate these stressors, some airports have introduced various amenities like spas, sleeping pods, restaurants, and cafes. While these facilities offer some level of comfort, the emotional benefits of natural landscapes, as highlighted by Ulrich et al. (1991), play a crucial role in significantly enhancing stress recovery. In addition, the green physical environment of an airport can provide various benefits to users, including psychological well-being, mental health, and comfort, while also offering environmental advantages such as reduced energy consumption, noise reduction, and pollution control (Vujcic et al., 2017; Trang et al., 2018). According to Han et al. (2020), green atmospherics as nature-based solutions at airports can play a critical role in improving mental health by reducing stress and transforming anxiety into confidence, while also enhancing the airport's positive image. While many factors must be considered in designing an airport terminal, one can argue that terminals should be designed as safe, efficient, and health-promoting environments that are both appealing and comfortable for its users. Nevertheless, despite the benefits of green and restorative spaces available at some airport worldwide, not all travellers may choose to utilise them. This could be due to various factors like a lack of awareness or limited time during

layovers. Additionally, the growing engagement with technology and increasingly busy lifestyles have led to less time spent in natural settings (Clements, 2004; Ballouard et al., 2011). This could indicate that some travellers may prefer using electronic devices over visiting airports' green spaces. Nisbet and Zelenski (2011) suggest that people often underestimate the benefits and enjoyment of spending time in nature. Incorporating restorative biophilic design in airports could help address this issue by encouraging more travellers to engage with natural elements. Nevertheless, it is crucial to further explore the factors that influence whether travellers choose to utilise these natural and restorative spaces, as this understanding will be key to effectively integrating such designs into airport environments. Thus, while airports are traditionally seen as mere transit points, their potential to positively impact travellers' well-being is substantial and has yet to be fully explored.

To clarify the author's approach in the thesis, it is important to highlight that while green spaces and biophilic design are widely recognised for their restorative benefits, this research does not assume that they are universally effective or suitable for everyone. The author acknowledges that what is considered restorative varies greatly among individuals—some may find relaxation in nature, while others may prefer activities like dining, shopping, or socialising in a pub. The aim of this study is to investigate what travellers find restorative in airport environments, without bias towards any particular type of space, be it green spaces or other amenities. This study seeks to explore a broad range of restorative elements to understand better what contributes to a positive airport experience for diverse passengers. Thus, the proposed research is important because it will enhance our understanding of how airport spaces can be designed as health-promoting environments for travellers. It addresses the often-overlooked potential of airports to contribute positively to traveller well-being. By exploring restorative elements in airport settings, this study contributes to the fields of environmental psychology and airport design. The findings can guide architects, planners, and designers in creating more comfortable and user-friendly airport environments.

1.2. The Role of Environmental Psychology in Enhancing Tourist Experiences

This section offers a theoretical foundation for the research, emphasising how environmental psychology principles can be utilised to improve the tourism experience by designing environments that promote restoration and well-being.

In 1972, Clare Gunn published *Vacationscape*, a pioneering work that introduced a structured methodology for designing landscapes, from small, intimate spaces to entire cities. This seminal book was the first significant contribution to tourism studies to challenge existing ideas and present innovative concepts for improving land development. Gunn's work viewed tourism as a complex system, explored how travellers form images of destinations, and offered design guidelines applicable from regional planning to site-specific development. *Vacationscape* was instrumental in advancing the field by emphasising a holistic approach to landscape design, which is closely aligned with principles of Environmental Psychology (EP). Environmental Psychology investigates the interplay between individuals, their surroundings, and the environment (Steg, van den Berg, & De Groot, 2012). This discipline is highly pertinent to tourism, as it examines how environmental factors influence emotions, behaviors, and overall well-being. In tourism contexts, the design of tourism places can profoundly affect tourists' stress levels, satisfaction, and overall experience. By integrating principles from EP, tourism professionals can enhance the design and management of spaces to improve tourist experiences. This approach addresses both psychological and sensory dimensions, thereby fostering greater well-being, enjoyment, and overall memorability for visitors.

Furthermore, tourists can be viewed as performers on various stages, with tourist destinations acting as these stages (Edensor, 2000). The design and characteristics of these 'stages'—or tourist environments—play a crucial role in shaping travellers' psychological experiences, influencing how they feel, behave, and engage with their surroundings. For instance, in unique settings like rural or island destinations, the potential for psychological restoration might be more feasible. Some rural and island environments can provide a break from the hectic pace of daily life, offering what is often

described as ‘getting away from it all’ (Baldacchino, 2012). The slower pace and natural surroundings can reduce stress and sensory overload, providing a more peaceful and calming experience. This concept aligns closely with the principles of *slow tourism*, which emphasises a more relaxed and immersive travel experience, slow travel, and sustainability (Kresic and Gjurasic, 2023). In addition, the concept of slow tourism advocates for a deeper engagement with destinations, focusing on quality over quantity, and encouraging travellers to appreciate the local environment and culture (see Appendix 1). Nevertheless, while some tourists are drawn to less regulated environments where they can fully engage in sensory and social experiences, others prefer the bustling atmosphere of urban destinations, such as cities like Barcelona or London. Thus, understanding how different types of tourist spaces—whether orderly or chaotic—affect behavior and emotions is essential for grasping how visitors engage with and experience these environments. By examining aspects of these diverse settings, we can determine how they either enhance or diminish the restorative benefits of tourism. This analysis ultimately impacts overall well-being and satisfaction, highlighting the significance of designing tourist spaces that foster a positive and restorative experiences.

1.2.1. Landscape Perception

Research, both empirical and theoretical, indicates that landscapes are associated with dual perceptions (Abraham et al., 2010). On one hand, landscapes are experienced physically through multiple senses, primarily sight, sound, touch, and smell. This perspective reveals that landscapes consist of various "scapes," such as soundscapes (e.g., Adams et al. 2006; Atkinson, 2007) and smellscapes (Porteous, 1990). On the other hand, landscapes also involve individual perceptions and experiences, indicating a dynamic relationship between physical reality and social or metaphorical interpretations. Consequently, the same landscape can be perceived in significantly different ways. In the context of tourism, the interaction between tourists and destinations shapes experiences, where destinations serve as the sites for exploration and tourists act as the participants (Stamboulis and Skayannis, 2003). As early as the 1980s, Fridgen (1984) characterised the connection between tourists and their destinations as a person-environment relationship, highlighting the influence of both physical and social environments on tourists. He observed that, in some cases, the environment acts merely as a backdrop for

activities, whereas in others, it becomes the primary attraction and motivation for the visit. Tourist experiences are, therefore, influenced by how individuals perceive and interpret a variety of sensory information within a landscape. This process extends beyond mere recognition of stimuli; it involves organising, categorising, and interpreting sensory data into meaningful constructs (Chhetri et al., 2004). Moreover, landscape perception goes beyond visual observation; it incorporates understanding, belief, and recognition, all shaped by a person's background knowledge, learning, and reasoning. The Gestalt theory of figure-ground relationships illustrates how objects are arranged and interpreted, showing that context can significantly alter perception (Koffka, 2013). Figure 1 demonstrates how a single image can be perceived differently depending on its background, highlighting the ambiguity inherent in visual stimuli. This variability underscores how personal perception and cognitive frameworks shape our experiences of both landscapes and images, leading to diverse interpretations among individuals. Furthermore, as Kim and Fesenmaier (2017) note, psychological filters—such as personal goals, past experiences, cultural backgrounds, and the presence of travel companions— affect how individuals perceive their surroundings. These factors contribute to differing responses to environmental stimuli.

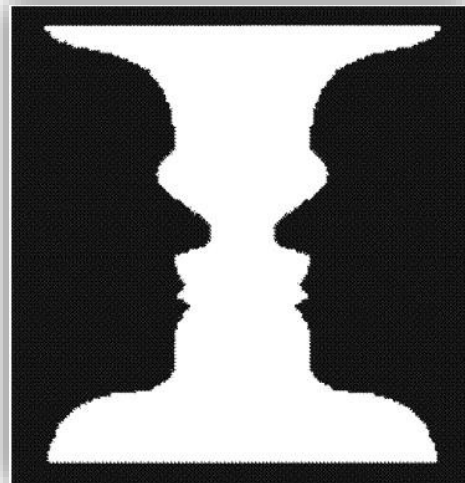


Figure 1. An illustration of visual ambiguity concerning figure and background (Chhetri et al., 2004)

Furthermore, experiencing features within landscapes involves a cognitive process that allows elements to be perceived as either pleasant or unpleasant. This applies equally to tourist destinations, which can evoke positive or negative feelings. Cackowski and Nasar

(2003) found that a visually pleasing landscape increases people's ability to tolerate frustration. Furthermore, an enclosed landscape may induce feelings of claustrophobia in some tourists while providing a sense of security for others. Research by Chhetri et al. (2014) indicates that individuals from urban backgrounds may perceive crowding differently than those from rural areas. However, the studies reviewed suggest a distinction between the impacts of natural and urban landscapes. Hartig et al. (2003) noted that participants who walked in the woods experienced lower levels of emotional and physical stress compared to those who walked in urban areas. This complexity suggests that human experiences in tourist destinations are multifaceted and uncertain, and no single theory can completely capture the nature of these experiences. The following section will further explore how these experiences are constructed, with a particular emphasis on the sensory aspects involved.

1.2.2. Creation of *Tourism Experience*

Figure 2 illustrates a conceptual framework for understanding the creation of tourism experiences, structured across four distinct levels. The first level is the sensory level, which operates below the threshold of conscious awareness, as described by Craig (2009). This foundational level involves the initial sensory stimuli that interact with the human body's sense organs, setting the stage for subsequent responses. The second level is the perceptive level, where travellers become fully conscious of the factors affecting their perception and experience of a place (Volo, 2009). At this level, individuals are actively aware of how various elements influence their overall experience. Moving to the third level, the cognitive and emotional level, travellers' brains, minds, and bodies engage actively with their environment. This level comprehends the internal processes that shape how individuals interpret and respond to their surroundings. Finally, the action level involves the transformation of information, learning, and memory formation (Volo, 2009). This stage is where experiences are integrated into long-term memory and where learning from the travel experience takes place. The framework emphasises that the tourism experience is rooted in embodied cognition and emotion, with the sensory process beginning through environmental stimuli impacting the body's sense organs. These initial sensory inputs then trigger emotional and cognitive responses. The resulting tourism experience is a blend of unconscious sensations and conscious perceptions encountered

during the trip. However, it is crucial to highlight that the outcomes of this experience can vary widely due to individual and situational filters, as highlighted by Sandström et al. (2008). This variability further emphasises the earlier mentioned complexity of tourism experiences and the interplay between sensory input, perceptive awareness, cognitive and emotional responses, and subsequent actions and memories.

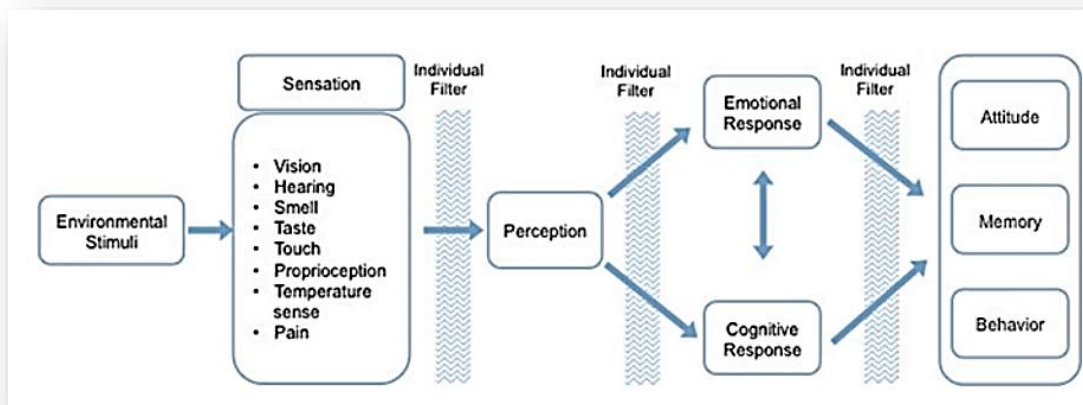


Figure 2. Tourism Experience Creation Framework (Adapted from Krishna, 2012)

1.3. The Impact of Sensory Stimuli on Travel Experiences

Sensation refers to the activation of sensory organs by external stimuli, laying the groundwork for how individuals perceive and interact with their environment (Krishna, 2012). Recent research highlights the importance of incorporating multisensory elements into the design of tourism experiences and destinations (Agapito, 2020). Sensory design encompasses more than just the traditional five senses (sight, hearing, smell, taste, and touch); it also examines how tourists engage with various aspects of a destination. Several factors influence tourist experiences, including ambient conditions (which affect the senses), the layout and organisation of the space, signs, symbols, and artifacts (which convey information and shape visitor perceptions), and social interactions (Edvardsson et al., 2005). The attractiveness of a destination goes beyond aesthetics, as no single sense predominates in the tourist experience (Kirillova et al., 2014). According to Low (2015), the emphasis on visual elements in the tourism sector has, to some extent, overshadowed the importance of other senses in how

visitors evaluate destinations. Moreover, interoceptive perceptions—such as hunger and thirst experienced during travel—have often been neglected in sensory research (Li et al., 2023). However, these internal sensations play a crucial role in shaping tourists' emotions and behaviors (Critchley and Garfinkel, 2017). As noted by Li et al. (2023) in their research, exposing tourists to sensory stimuli can enrich their experiences. They suggested that industry professionals should leverage these sensory opportunities to potentially develop new tourism hotspots. Additionally, the findings of the same study reveal that the local community consists of "participants" who contribute to visitors' authentic sensory experiences (Li et al., 2023). A variety of economic activities and the daily routines of residents shape the sensory environment of a destination. Elements such as the dialect spoken by locals, announcements on buses, and songs performed by residents in historic towns contribute to the overall sensory landscape of a place. Furthermore, tourists are particularly responsive to sensory influences as they navigate unfamiliar environments that introduce new sensations or highlight existing ones in novel ways (Agapito, 2020). Ultimately, integrating rich sensory stimuli into tourism design can greatly enhance visitor engagement and overall travel experience, making it more immersive and memorable (Lv et al., 2020; Zach and Krizaj, 2017).

1.3.1. Enhancing Landscape Design Through Sensory Integration

Research in sensory studies indicates that when the arousal qualities of multiple sensory modalities align, approach behaviors are enhanced (Krishna, 2012). This alignment creates a more inviting and appealing environment, encouraging individuals to explore and interact with the space. As noted by Madzharov (2022), engaging the senses can subtly influence consumer behavior, particularly among tourists. Thus, one can argue that the principles of sensory marketing and environmental psychology can be effectively applied to airport design to improve traveller well-being and alleviate stress. The environmental factors influencing traveller experience at locations like airports can be enhanced through, but are not limited to, the following approaches:

Prioritising Atmosphere Over Products: The atmosphere during a transaction can significantly alter customer attitudes, with environmental factors shaping perceptions and behaviors (Kopec, 2018). Airports can focus on creating a pleasant ambience, where

thoughtful design elements promote a calming environment, potentially enhancing traveller satisfaction more than available amenities. This includes optimising lighting, seating arrangements, and overall layout to improve comfort and reduce stress.

Utilisation of Music and Soundscapes: Building on the research of Rieunier (2009), the strategic incorporation of music and ambient sounds can significantly influence mood and behavior. For instance, relaxing music in waiting areas of an airport or gentle nature sounds may help reduce stress and enhance the overall traveller experience. Research by Areni and Kim (1993) found that background classical music led to higher purchases of expensive items. Similarly, North, Hargreaves, and McKendrick (1999) demonstrated that the type of music, such as French versus German, affected wine purchases based on the music played.

Incorporating Nature Sounds: In line with Esteky (2021), integrating natural sounds and visuals, such as birds chirping or displays of greenery, can foster a restorative environment, effectively reducing stress and enhancing the airport experience. Additionally, music can influence perceptions of time and comfort through tempo adjustments. For example, faster-paced music in restaurants can prompt quicker dining, while slower music encourages patrons to linger. This strategy is often employed in retail to increase sales, for example, Borders Bookstore, the former multinational book and music retailer who used the calming music to enhance sales, contrasting with fast-food establishments that utilise upbeat music for rapid turnover (Sliburyte and Ny, 2007).

Including Olfactory Elements: Specialty stores such as bakeries, chocolate shops, and florists typically offer product lines that emit distinct ambient scents (Mitchell et al., 1995). Furthermore, the use of scents to create a pleasant atmosphere is well-documented in tourist resorts, hotels, and shops. Travellers encounter diverse sensory experiences that differ from their daily routines, including new sights, sounds, and notably, scents. Madzharov (2022) categorised scents based on their meanings, which enhance mental associations. For example, citrus scents often connote cleanliness, potentially encouraging environmentally conscious behaviors when introduced in hotel rooms. Warm scents, like cinnamon, may create a cosy atmosphere, while cool scents, such as peppermint, evoke freshness (Madzharov et al., 2015). Strategically using these scents can influence perceptions in critical contexts, such as in elevators or security lines at airports (Madzharov, 2022).

Implementing Biophilic Design: In *Nature by Design*, Kellert (2018) discusses the disconnect between humans and nature in modern society. He argues that this separation is exacerbated by contemporary trends but emphasises that conscious design can help restore this connection. Biophilic design, which prioritises the beneficial experiences of nature in built environments, could be further integrated into airport design. As Kellert et al. (2011) explain, implementing biophilic design at environments is not merely about adding greenery for aesthetic appeal; but it also involves understanding humanity's relationship with nature and how this relationship influences traveller's experiences. Thus, while incorporating biophilic elements into airport design might be highly beneficial, it is equally important to study and understand how these spaces are utilised.

1.3.2. Sensory Experiences in Airports

Airports are distinct environments where travellers move between various locations, cultures, and experiences. The sensory stimuli present in these spaces—encompassing sights, sounds, smells, and tactile elements—are crucial in influencing the overall experiences of travellers. This section presents the specific examples of sensory experiences offered in airports, highlighting how they enhance well-being, reduce stress, and create a more pleasant travel experience.

Visual Stimuli

Research shows that exposure to natural light and green spaces can reduce stress levels and enhance mood (Kaplan and Kaplan, 1989). Additionally, effective lighting can aid in wayfinding and navigation, which is particularly crucial for travellers in airports. Getting lost in an airport can be a distressing experience, especially for those who have a fear of flying or are under time constraints to catch a flight. A prime example of effective visual stimuli is the large glass dome at Singapore Airport, which floods the interior with natural light, creating an atmosphere reminiscent of walking through a park rather than a typical airport terminal (Figure 3). The green spaces within the airport also allow ample natural light to reach passengers, thereby contributing indirectly to their health and well-being.



Figure 3. Jewel Changi Airport, home of world's tallest indoor waterfall – (© Changi Airport Singapore, n.d.)

Auditory Experiences

Soundscapes significantly influence how airport passengers perceive their environments, with airport announcements, background music, and ambient sounds capable of either calming or heightening stress levels. Recent research looked at the impact of reduced noise on passenger experience and airport efficiency (Andrews, 2024). It was highlighted that silence transcends mere absence of sound; it fosters a profound sense of tranquillity, transforming the passenger experience from chaotic to calm. Passengers in quieter airports reported greater satisfaction, primarily due to reduced auditory overload, which allows them to relax or work undisturbed. Instead of constant loudspeaker announcements, silent airports can focus on creating a peaceful atmosphere by using digital displays and personal notifications to guide travellers. The rationale for adopting the silent airport concept is twofold: it aims to minimise noise pollution—a well-known stressor for travellers—and to streamline operations by cutting down on announcements. This encourages passengers to rely on digital tools for navigation, enhancing their self-sufficiency. Nevertheless, while silence can be advantageous in these settings, ensuring it resonates with all travellers requires a coordinated approach involving technology, policy changes, and staff training (Andrews, 2024). Furthermore, research indicates that soothing music is particularly effective in reducing stress and blood pressure compared to silence (Iyendo, 2016). London City Airport has become the first UK airport to play music in the main security area, featuring two carefully curated playlists—ambient electronica and upbeat acoustic music—played throughout the day.

At Amsterdam's Schiphol Airport, birdsong is featured in a peaceful lounge designed for relaxation before flights. To enhance the calming atmosphere, the birdsong is played through speakers concealed within real trees (Winterman, 2013).

Taste and Culinary Offerings

The culinary landscape within airports also enhances the sensory experience for travellers. For example, Walker's Shortbread¹ launched a "shortbread-scented" sensory experience at Edinburgh Airport, invited passengers to embark on a sensory journey through a pop-up location that encourages them to "experience the joy of shortbread" via sight, smell, and taste (Fig.4.). Another notable instance of a tasting experience can be found at Istanbul Airport, where Woodford Reserve² introduced the 24-Hour "Sensorial Experience" Pop-Up Whiskey Lounge. The lounge featured a unique bonbon developed in partnership with Usla Akademi, a prominent culinary academy in Turkey, to provide travellers with a tasting experience of Woodford Reserve Bourbon (TRBusiness, 2023).



Figure 4. Walker's Shortbread sensory experience in Edinburgh Airport (Edinburgh News, 2024)

¹ Walker's Shortbread is the Scottish manufacturer of shortbread, biscuits, cookies, and crackers: <https://www.walkersshortbread.com/>

² Woodford Reserve is a brand of bourbon and other whiskeys made at a National Historic Landmark distillery in Kentucky: <https://www.woodfordreserve.com/en-uk/>

Olfactory Experiences

Our sense of smell is remarkable and has the power to trigger memories and emotions (Ehrlichman and Bastone, 1992). Airlines are capitalising on this olfactory potential, with many beginnings to incorporate scents into the onboard experience. For example, Singapore Airlines, All Nippon Airways, and Turkish Airlines enhance passenger enjoyment by using fragrances, including scented towels and a subtle perfume in the cabin (CNN, 2017). Similarly, airports are seizing this olfactory opportunity, with many starting to implement scents in their lounges. A notable example is at London Heathrow Airport, where an installation in the departures lounge of Terminal 2 features a large "scent globe" that immerses participants in the aromas of South Africa, Japan, Brazil, China, and Thailand (Bluebiz, 2015). This interactive and multi-sensory installation themed around international destinations allow passengers to instantly release streams of scented air with the touch of an icon on a touchscreen (Fig.5).



Figure 5. The Heathrow 'Scent Globe' sprays aromas associated with different countries (© ICT, 2014)

Tactile Elements

In the rapidly evolving world of air travel, accessibility and inclusivity have become vital considerations in airport design (Murugan, 2024). As a result, many airports are incorporating sensory rooms into their lounges. These interactive spaces are specifically created to support travellers who are neurodivergent and may experience heightened stress in busy, unfamiliar terminals. Sensory rooms can greatly benefit individuals with conditions such as autism, dementia, and other sensory processing difficulties. Moreover, airports are now providing additional relaxing options for those who may not be neurodivergent but still seek a quiet place to reflect, pray, or escape the bustle of a crowded terminal (see Figure 6). Increasingly available choices include quiet rooms, lounges, and comfortable seating areas. However, research conducted by Altogether Travel, the UK's first Care Registered travel company, indicates that only three airports in the UK currently offer sensory rooms. This presents a significant opportunity for more airports to create designated spaces for relaxation. A notable example is Liverpool John Lennon Airport, which has successfully implemented sensory areas to help passengers unwind before their flights (see Figure 7).



*Figure 6. Health & Wellness Space at George Bush Intercontinental Airport (IAH)
(©traveldailynews.com)*



Figure 7. Liverpool John Lennon Airport: sensory space (©BBC, 2024)

1.4. Restoration and Stress Reduction Theories

Research indicates that environments featuring natural elements such as trees, lakes, and mountains can help reduce stress and apathy, and enhance mood (Nisbet & Zelenski, 2011; Ryan et al., 2010). Additionally, these natural spaces have been found to promote physical activity and social interactions, which can contribute to improved health and well-being (Hartig et al., 2014; Pasanen et al., 2014). The connection between landscapes and health is well-documented across various cultures and historical periods, with the incorporation of natural elements in places like hospitals dating back to ancient civilizations in China, Persia, and Greece (Glacken, 1967; Velarde et al., 2007). Environmental psychologists not only study the effects of urban and natural environments on people but also focus on restorative environments—settings that help individuals recover from psychological stress (IAPS, 2022). According to Von Lindern et al. (2016), restorative environments support recovery by minimising perceived social and physical constraints, such as crowding and noise, and by incorporating certain environmental features. Moreover, the concept of restoration is not solely about specific surroundings but also about the interactions between individuals and their environments (Hartig, 1993).

Furthermore, research on restoration consistently shows that natural environments have a significantly higher potential for restoration compared to urban settings (e.g., Ulrich et al., 1991). The *Attention Restoration Theory* (ART) supports this idea, suggesting that natural landscapes generally offer key factors needed for restoration (Kaplan and Kaplan, 1989). According to ART, people can recover their attention by focusing on natural elements that they find engaging. For instance, Ulrich (1984) studied the impact of hospital room views on patient recovery and found that those with windows overlooking natural scenes had shorter hospital stays and fewer negative comments compared to those with views of a brick wall. Similarly, Wells (2000) discovered that views of green spaces rather than pavements were associated with better cognitive performance in low-income children. Another framework for understanding the restorative effects of environments is *Stress Recovery Theory* (SRT) (Ulrich, 1984, 1999). Unlike ART, which focuses on attention fatigue, SRT emphasises stress reduction as the basis for restoration. It posits that natural settings are more effective at reducing stress compared to built-environments. This aligns with other studies that highlight individuals' preference for natural landscapes—such as beaches, water bodies, forests, parks, and mountains—as a means of recovering from mental fatigue (Korpela and Hartig, 1996; Korpela et al., 2001; Staats et al., 2003; Staats and Hartig, 2004). One explanation for this preference is that natural environments often include elements that fulfil fundamental human biological needs, such as refuge and security (Velarde et al., 2007; Valera and Vidal, 2017). Additionally, the *Prospect-Refuge Theory* (Appleton, 1975) suggests that people favour environments that offer both open views and a sense of enclosure, providing both visual access and a place to retreat. Although research on prospect-refuge typically focuses on simulated rather than restorative environments, it highlights that the sense of refuge may be particularly important for stressed individuals in restorative settings (Grahn and Stigsdotter, 2010).

Nevertheless, psychological restoration in urban environments is increasingly recognised as a challenge (Krzywicka and Byrka, 2017). Research indicates that built urban environments can also offer restorative benefits comparable to those of natural settings (e.g., Weber and Trojan, 2018). For instance, Scopelliti and Giuliani (2004) found that people often do not distinguish between restorative experiences in nature and those in urban areas. They discovered that locations associated with leisure and social activities

were also perceived as restorative and accessible in urban settings. Similarly, Mejía-Castillo et al. (2016) found that, in addition to green spaces in schools, cafeterias were also considered restorative by students. Nonetheless, the Attention Restoration Theory and Stress Reduction Theory have traditionally focused on the restorative potential of natural environments, often overlooking the potential benefits of built environments (Weber and Trojan, 2018). Although these theories provide explanations for why natural environments might be more effective for restoration, they do not discount the possibility of restorative experiences in urban contexts. Both ART and SRT can be applied to urban settings (Kaplan et al., 1993; Ouellette et al., 2005; Herzog et al., 2010).

In conclusion, built environments represent a largely unexploited resource for enhancing human and environmental health (Jackson, 2003). Weber and Trojan (2018) suggest that exploring existing urban settings could reveal new restorative spaces. Therefore, further research into urban spaces, including airport terminals for instance, is recommended to determine their potential for providing restorative benefits and to identify the conditions under which they are most effective.

1.5. Urban Context and the Importance of Health-Promoting Spaces

As predicted by United Nations, with more than half of the global population residing in urban areas—a number expected to increase to 68% by 2050. Thus, the importance of examining health-promoting environments in urban settings has become increasingly vital, particularly in light of the mental health challenges associated with urban living (Ventriglio et al., 2021). Research indicates that urban green spaces offer numerous advantages, such as improved physical health (Dempsey et al., 2018), lower stress levels (Schipperijn et al., 2010), greater physical activity (Ambrey, 2016), and enhanced social cohesion (Maas et al., 2009). Drawing on health-promoting influence of landscape, Abraham et al. (2010) proposed a heuristic framework to link landscape and health in a way that is amenable to health promotion research and practice (Fig. 8). The framework illustrates how the three dimensions of health—physical, mental and social well-being—are promoted through designed, constructional, and aesthetic aspects of landscape. As described by Abraham et al. (2010), landscape might function as a spatial framework for

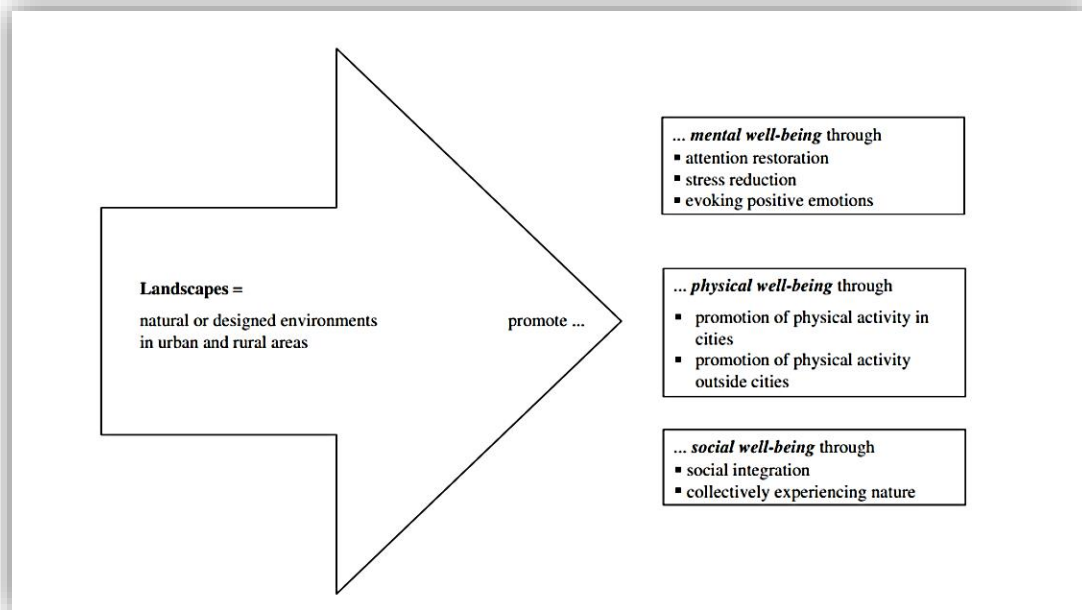


Figure 8. Heuristic framework on the health-promoting impact of landscape (Adapted from Abraham et al., 2010)

health-promoting activities, such as: evocation of positive emotions, attention restoration, stress recovery, physical outdoor activities in and outside cities, collective experience of nature, and social integration. To enhance health, landscapes must possess specific characteristics that directly or indirectly influence human well-being transforming them into "good places" for health (Frumkin, 2003). Landscapes should support health in daily life, ensuring that all individuals have access to health-promoting environments at home, work, and during leisure activities. Nevertheless, as highlighted by previous research, challenges arise due to the social and cultural diversity in people's landscape preferences, needs, and usage (Abraham et al., 2010). Furthermore, one must remember that health-promoting landscapes are perceived and utilised differently among various social groups, making them context-specific.

1.5.1. Health-promoting airports: Case study of Singapore Changi Airport

As part of the course on *Landscape Analysis for People and Environment Studies*, I have written assignment about health-promoting spaces at airports. Using Singapore Changi Airport as my case study, I incorporate this section of the assignment into my

thesis, as it aligns closely with my research topic. Figures 9 and 10 illustrate the layout of the airport greenspace, featuring a 40-meter-high Rain Vortex, the tallest indoor waterfall in the world, along with a four-story, 21,000-square-meter Forest Valley that houses over 120 different species of trees and plants. The greenspaces include the Piazza Garden, which showcases seasonal, thematic, and culturally significant plants; the Sculptural Tree Garden; the Outdoor Rooftop Cactus Garden; the Discovery Garden, featuring culinary herbs cultivated on wooden shelves; and the Butterfly Garden, home to approximately 1,000 tropical butterflies representing around 40 different species.

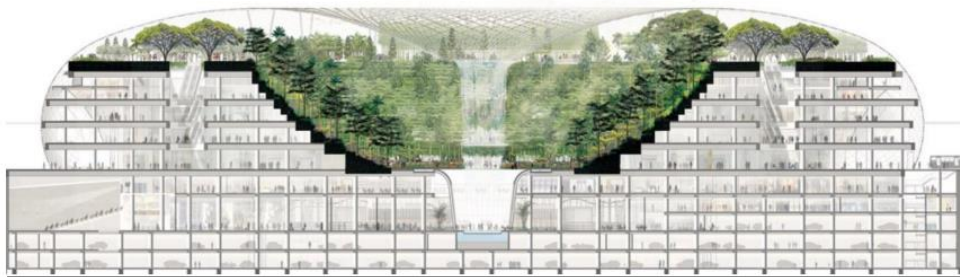


Figure 9. The design of Singapore Airport's Greenspaces

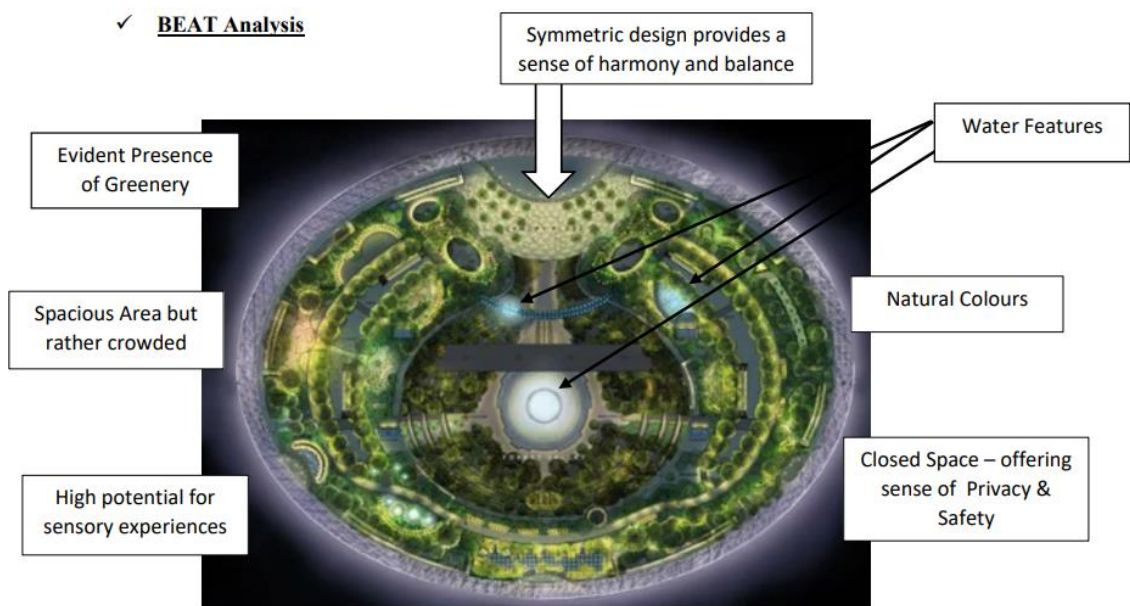


Figure 10. Site plan of the Singapore Airport's Greenspace and noticeable factors (author's design)

The "biophilia hypothesis" suggests that people have an inherent tendency to seek a connection with nature (Wilson, 1984). Lin et al. (2018) emphasise the increasing acknowledgment of the significance of engaging with nature for society as a whole. According to the author, Singapore Changi Airport understands the value of promoting greenspaces to help individuals connect with nature in their daily lives (see examples at Fig. 11) This raises the question: could contact with nature become an essential aspect of health-promoting airports?



Figure 11. Example of nature components seen in Singapore Airport's (©Changi Airport Singapore, n.d.)

As previously highlighted, common sources of stress at airports include time pressure, crowds and queues, security checks, and the journey to the airport itself. Nevertheless, Han et al. (2020) highlight that green atmospherics, as nature-based solutions, can significantly enhance users' mental health by alleviating stress and converting anxiety into confidence. Similarly, Ulrich et al. (1991) demonstrated that viewing natural landscapes elicits emotional responses that positively impact stress recovery, underscoring the importance of incorporating nature within airports. Singapore Airport has implemented several effective practices to help reduce stress, such as enhancing the availability of green spaces for resting and waiting for flights, increasing the visibility of the natural environment by including various plants and trees, and installing more glass windows to allow for greater natural light. Additionally, passengers can alleviate stress by engaging in the many activities available in the airport's spaces (see Fig. 12).



Figure 12. Activities at Singapore Airport: Hedge Maze and Art Station (©Changi Airport Singapore, n.d.)

Kellert and Calabrese (2015) suggest that positive experiences with water features in built environments can enhance satisfaction, promote health, and alleviate stress. It is also believed that water can convey a sense of security within a space (Ulrich, 1993), which is especially important in settings like airports. Singapore Airport not only boasts the world's largest indoor waterfall, the Rain Vortex, but also features numerous water pods, countless mini waterfalls, garden fountains, and rills, creating the impression that the airport includes every type of water feature imaginable (Figure 13).



Figure 13. Water features available at Singapore Changi Airport (© Changi Airport Singapore, n.d.)

Singapore Airport features a range of restorative spaces that include various walking trails, multiple playgrounds, a swimming pool, trampolines, slides, and even a walking net. These amenities offer ample opportunities for physical activity. Additionally, the

airport facilitates convenient access between the green areas and the terminals, allowing visitors to cycle or jog easily. Physical activity is very important for overall health and well-being, as it helps reduce stress, improve mood, and enhance physical fitness (Biddle and Asare, 2011). Regular engagement in physical activity can also contribute to better cognitive function and emotional resilience (Ratey and Loehr, 2011). By incorporating such facilities, Singapore Airport not only promotes physical well-being but also fosters a more enjoyable experience for travellers (Fig. 14).



Figure 14. Example of sport activities offered at Singapore Airport (©Changi Airport Singapore, n.d.)

1.5.2. Animal-Assisted Intervention: A Case Study of Aberdeen Airport

Research has shown the health benefits associated with human-dog relationships, indicating that dog ownership is linked to positive cardiovascular outcomes, including lower blood pressure and reduced stress reactivity compared to non-dog owners (Allen et al., 2001; Allen et al., 2002; Allen, 2003). Furthermore, interactions with dogs, such as petting, promote social engagement and decrease anxiety. Brief sensory interactions with dogs have been found to lower blood pressure, heart rate, and stress-related hormone levels (Beetz et al., 2012; Handlin et al., 2011).

The Canine Concern Scotland Trust (CCST) is a registered charity located in Scotland that promotes responsible dog ownership while enhancing the well-being of both dogs and people. Founded in 1988, CCST utilises the therapeutic potential of dogs to improve

mental health across various environments, including hospitals, nursing homes, schools, prisons, and airports. At Aberdeen International Airport (ABZ), CCST operates the Canine Crew Programme³, which includes therapy dogs and their handlers. These registered *Therapets* are recognised for their ability to alleviate anxiety and enhance the overall passenger experience (Guardian, 2019). Additionally, stressed offshore workers at Aberdeen Heliport benefit from the comforting presence of a canine crew specifically recruited to help them manage pre-flight anxiety. This animal-assisted intervention included in the *Helipets* programme⁴ was designed to reduce pre-flight anxiety, ensuring a more relaxed experience for these workers. By integrating animal-assisted interventions in both airport environments and for offshore workers, CCST underscores the significant impact of these programs on mental well-being. This approach reinforces the importance of creating restorative environments for travellers, highlighting how therapy dogs could contribute to enhancing airport experiences by reducing stress and promoting relaxation.



Figure 15. *Therapy Dogs at Aberdeen Airport: I (Guardian, 2019)*

³ Aberdeen Airport and *Therapets* programme: <https://www.aberdeenairport.com/aberdeen-airport-guide/special-assistance/therapet-dogs-programme/>

⁴ *Helipets* programme: <https://www.aberdeenlive.news/news/helipets-canine-crew-set-aberdeen-9067650>



Figure 16. Therapy Dogs at Aberdeen Airport: II (Guardian, 2019)

1.6. Research Aim and Questions

The research objectives clarify *how* I intend to achieve the aim of the study, reflecting specific actions or steps I took, whereas the research questions pinpoint the *inquiry* and *explorative aspects* I wish to answer.

1.6.1. Aims and Objectives

My study intends to bridge the gap between environmental psychology and urban design, with a focus on creating more positive, health-promoting environments within airports. Thus, the main aim of this research study is to **explore the extent to which airport environments can function as restorative spaces that could enhance traveller well-being and reduce stress**. To achieve this, the study has set the following objectives

Objective 1: Conduct a literature review to understand existing research on stress factors, and restoration in airport environments, and the psychological impact of environmental design.

Objective 2: Gather and analyse survey data from travellers to identify perceived stressors and perceived restorative elements within airport spaces.

Objective 3: Assess design features or areas (e.g., green spaces, quiet zones, seating arrangements) to determine which elements travellers find most conducive to relaxation.

1.6.2. Research Questions

The research questions that align with this study are as follows:

RQ.1. What factors do travellers identify as most stressful in airport environments?

RQ.2. What are the key features of airport design that travellers perceive as most restorative?

RQ.3. What recommendations can be made to enhance the restorative aspects of airport spaces based on the study's findings?

1.7. Rationale, Significance, and Contribution⁵ of the Study

This research contributes to the body of knowledge by serving as a baseline for further studies on airport environments and their restorative potential. It will provide new insights into whether airports can indeed function as restorative spaces, considering the stressful conditions typically associated with air travel. Moreover, it will identify key airport features perceived as restorative by travellers. This comprehensive approach will ultimately enhance the understanding of the relationship between airport design and mental well-being, paving the way for future research in this vital area.

This study addresses a critical gap in existing research by examining the potential of airport environments to serve as restorative spaces for travellers. Given the high-stress nature of air travel, it is essential to investigate whether airports can contribute positively to the well-being of passengers. The rationale behind this research lies in the recognition

⁵ **Contribution** focuses on what new knowledge my study brings.

Rationale explains why the research is needed and relevant.

Significance addresses the broader implications and impact of my findings.

that airports, as integral components of modern travel, have the potential to alleviate stress and promote mental health. By exploring the restorative qualities of airport design, this study aims to lay the groundwork for future research in this area.

The significance of this study is multifaceted. As air travel becomes more prevalent, understanding how airport environments can foster well-being is increasingly important. This research highlights the potential for airports to be designed with elements that enhance relaxation and reduce stress. The findings will provide valuable insights for airport authorities and designers, informing them of effective strategies for creating spaces that promote health and well-being among travellers. Ultimately, the study aims to learn on how to enhance the overall airport travel experience, making it more enjoyable and less stressful for passengers. To some extent, the insights gained from my research can extend beyond airports to other high-stress environments such as bus terminals, train station, and other public spaces. This implies that insights regarding restorative airport features can guide the development of comparable spaces aimed at enhancing well-being.

2. Research Methods

2.1. Introduction

The researcher employed a quantitative methodology for this study, utilising a survey as the primary tool for data collection and analysis, aligned with the research's objectives. Surveys serve as an effective strategy for capturing and measuring individuals' opinions, thoughts, and experiences (Adu and Miles, 2024). Given that the study aimed to assess travellers' views on how airport environments function as restorative spaces to enhance well-being and reduce stress, this quantitative method was deemed appropriate. The advantages of this approach include efficiency in time management, conservation of resources, safeguarding participant privacy, and the ability to replicate findings (Creswell, 2009; Lichtman, 2013). While some researchers criticise quantitative methods for restricting participant input and adhering to a rigid research design (Bryman, 2016; Sarantakos, 2013), these characteristics were viewed as vital for achieving the aims of this study. The survey primarily consisted of closed-ended questions, supplemented by a few open-ended questions (Appendix 2). The inclusion of open-ended questions was necessitated by the researcher's constraints regarding time and resources, as in-depth interviews were not feasible (Huer and Saenz, 2003). Unlike closed questions that confine responses to predetermined options, open questions allow respondents the flexibility to share insights that may not have been expected. This approach can reveal new themes or issues that are crucial for a more comprehensive understanding of the topic.

2.2. Sampling Strategy

Sampling is a fundamental and crucial step in conducting surveys, as it significantly impacts the overall accuracy of the research. Sincero (2012) emphasises that a 'sample' refers to a group of individuals that represents the entire target population of the study. The primary goal of this research is to gain insights into travellers' perceptions and

preferences regarding restorative environments in airports. To achieve this, the study focused on passengers who have flown within the last 18 months, making them eligible to participate. To ensure representative findings, it was essential to determine the necessary minimum number of participants. The sample size for the research was influenced by various factors, including the sampling technique, the study's purpose, available resources, and the timeframe. After considering these elements, a sample size of 100 participants was selected. According to the researcher, this number aligned well with the chosen sampling technique and provided reasonable findings within the constraints of available resources and time for this study.

2.3. Data Collection Process

To gather data, a semi-standardised questionnaire was utilised, which can be appealing to both quantitative and qualitative researchers (Sarantakos, 2017). The questionnaire was developed using *Jisc Online Surveys*⁶, an online survey tool. Before its launch, a pilot version of the survey was shared with three respondents to assess readability and layout. Feedback from this pilot allowed for necessary adjustments to improve the questionnaire (Ismail et al., 2018). Ultimately, 100 responses were collected, providing a robust dataset for analysis. The questionnaire was distributed over a brief period, from March 11th to March 14th, 2024, through email and social media platforms like Facebook, Instagram, and LinkedIn. Other students and colleagues helped the author in promoting the questionnaire link on social media sites. The swift response rate facilitated reaching the required number of participants within the limited time frame. The implementation of the survey involved four steps:

1. **Questionnaire Design:** The questionnaire was carefully constructed to align with the research aims.
2. **Pilot Testing:** A pilot survey was conducted to refine the instrument based on participant feedback.
3. **Survey Distribution:** The final questionnaire was distributed online, maximising outreach and response rates.

⁶ <https://www.jisc.ac.uk/online-surveys>

4. Data Collection: Responses were gathered over a four-day period.

2.4. Data Analysis

Survey analysis involved transforming raw survey data into insights that align with the study's objectives. The data collected was examined using several tools, and analysed to produce descriptive statistics, which were then reported and presented in the form of graphs and diagrams. For the qualitative data analysis, specifically the open-ended responses, Leximancer⁷—a text mining software—was utilised. This software includes a concept mapping feature that visually represents themes and concepts, facilitating interpretation and communication of findings. Leximancer helped to identify the primary concepts within the text and illustrates their interconnections. In addition to concept mapping, the data was presented through word clouds, and graphs created using Excel and the Jisc Online Surveys platform. Finally, in the course of preparing this thesis, the author utilised ChatGPT 4.0 to improve readability and ensure correct spelling and grammar. Following this, the author thoroughly reviewed and edited the content as necessary and accept full responsibility for the final publication.

2.5. Ethical Considerations

During the online survey, participants were required to confirm their eligibility by ticking a box before beginning the survey. They needed to have flown by air within the last 18 months, and upon clicking "agree," they consented to participate in the study. Participants received detailed information about the research's purpose, their role, and their rights as participants. They were informed of their right to withdraw from the study at any time without any repercussions. In addition, participants were assured that their responses would be treated with confidentiality and used exclusively for research purposes. I reviewed the privacy policy of the survey platform concerning participant data, allowing me to make informed decisions about how to safeguard respondents' information. As the researcher, I am responsible for ensuring the protection of participant

⁷ <https://www.leximancer.com/>

data, which should be securely stored (Dale et al., 2012). The collected data have been securely stored, and once the project is completed, it will be disposed of securely.

3. Results

3.1. Participants' Profile

3.1.1. Demographics

Figures 17 and 18 present demographic information about the respondents, including their gender and age. Over half of the respondents were female, accounting for 65% of the sample, while 31% identified as male. Additionally, 3% of the sample identified as another (non-binary) gender. The age distribution of the respondents was predominantly over 25 years old (Figure 17), with no participants in the 18-24 age range. Furthermore, 12% of the respondents were aged 65 and older.

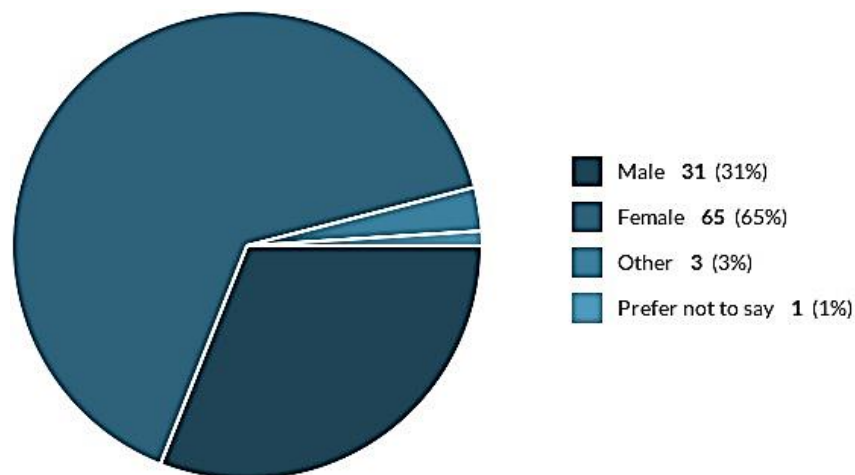


Figure 17. Demographic profile of the respondents (Gender)

Rank value	Option	Count	Mean rank	3.51
1	18-24	0	Variance	1.89
2	25-34	31	Standard Deviation	1.37
3	35-44	26	Lower Quartile	2.0
4	45-54	16	Upper Quartile	5.0
5	55-64	15		
6	65+	12		

Figure 18. Age breakdown of respondents

3.1.2. Travel Behaviours

As illustrated in Figure 19, the majority of respondents (59 percent) travel by air every 2-3 months or every 4-6 months, with the latter group making up 40%. Only 10 individuals (10% of all respondents) travel less than once a year, indicating that most respondents are regular travellers and frequent airport users. Additionally, Figure 17 shows that in the past 18 months, the vast majority of respondents (94 percent) travelled for leisure or a combination of leisure and business purposes (commonly referred to as "bleisure"), while only 4% travelled exclusively for business reasons (Figure 20).

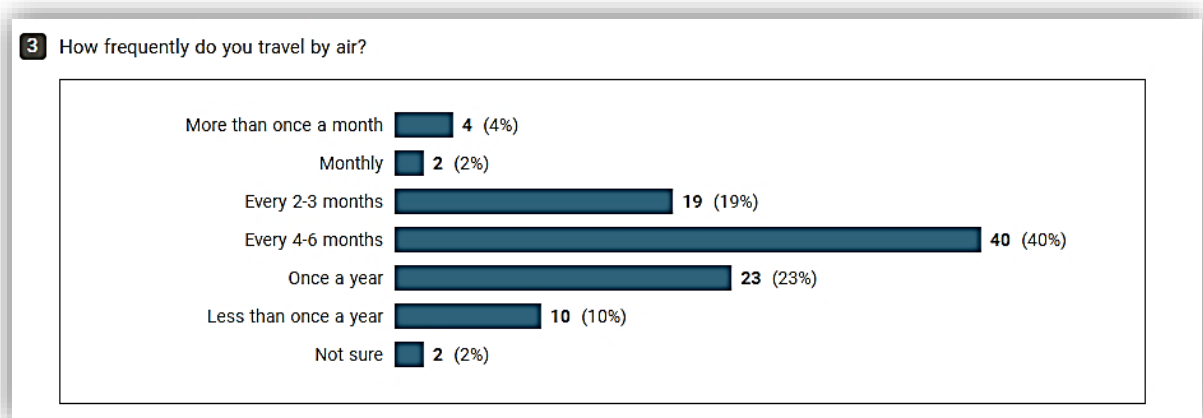


Figure 19. Respondents' Frequency of Travel

4 Reflecting on the flights you took over the last 18 months, what was the primary reason for your travel?

Rank value	Option	Count	Mean rank	2.16
1	Mostly business	4	Variance	0.22
2	Mostly leisure	74	Standard Deviation	0.47
3	A mix of both business and leisure	20	Lower Quartile	2.0
			Upper Quartile	2.0

Figure 20. Respondents' Reasons for Travel

3.1.3. Restorative Activities

As this study aims to explore what travellers find restorative in airport settings, it was helpful to first understand what participants consider restorative in their daily lives. As shown in Figure 21, the top three activities identified were socializing with friends and family (68%), spending time outdoors (58%), and listening to music (43%). Additionally, one in four respondents (25%) indicated that watching movies is also restorative. Other activities deemed at least somewhat restorative included practicing mindfulness or meditation (6%) and playing video games (7%). Two respondents mentioned other activities, including cooking and completing puzzles.

5 Please select the top three activities or environments that you find most restorative in your daily life:

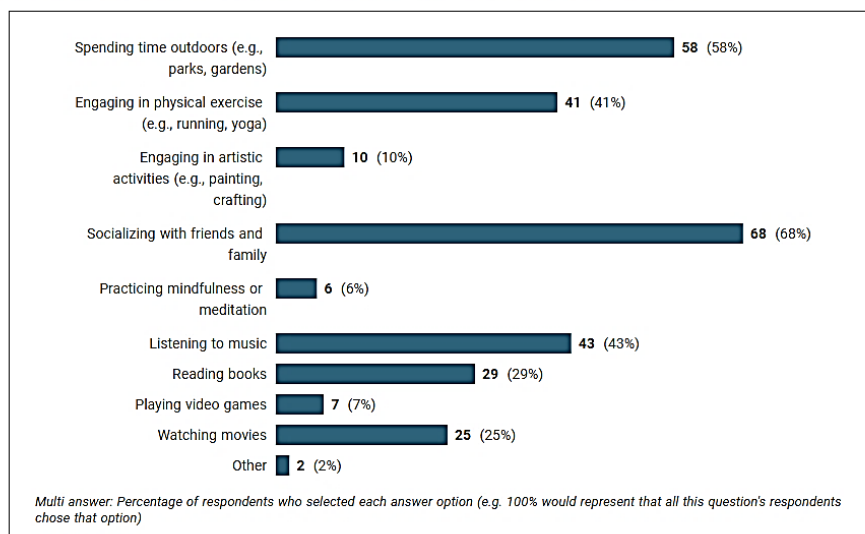


Figure 21. Most restorative activities in daily life of respondents

Question 6 of the questionnaire inquired about the airport spaces that participants find most conducive to rest and relaxation. Interestingly, the highest percentage of respondents identified restaurants and cafes (85%) as the most relaxing spaces, followed by airport lounges (60%) and quiet zones (50%), as presented in Figure 22 below. Duty-free shopping was mentioned by 38% of participants, while green spaces, such as indoor gardens, living walls, and plant displays, were selected by 28%. Eight individuals suggested additional spaces, including smoking zones (2%), VIP areas, locations with massage chairs, spots with outdoor views, and areas for plane spotting. Notably, one participant stated that they saw no need to rest while at the airport.

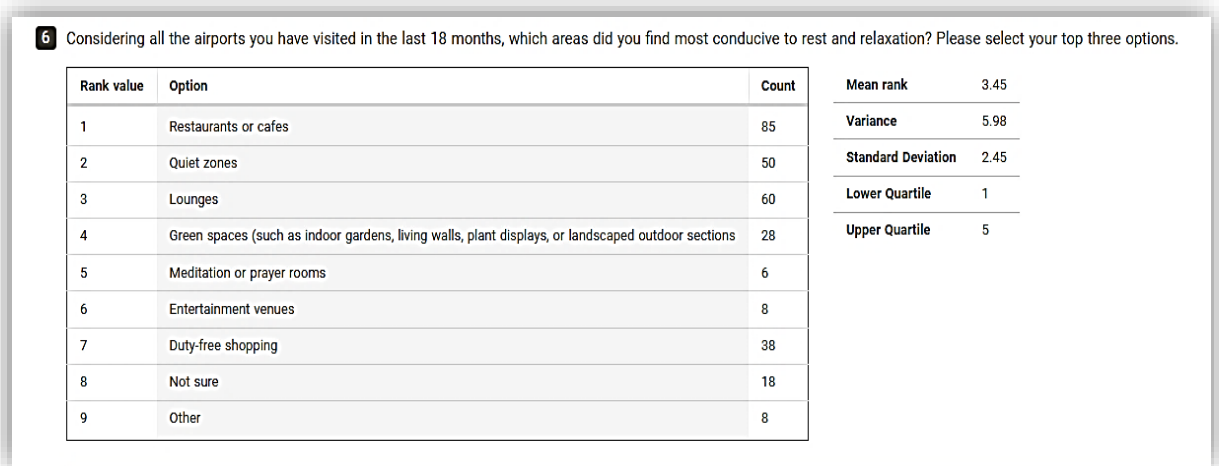


Figure 22. Most restorative areas at airports according to respondents

3.2. Perception of Stress at Airports

To gain a better understanding of whether airport settings are perceived as stressful, as indicated by numerous reports and literature, we asked participants how stressful they find the airport environment (Fig. 23). The results revealed that a significant majority (77%) reported experiencing some level of stress at airports, with their experiences ranging from slightly to extremely stressful. Conversely, 23% indicated that they did not find their airport experience stressful at all. Participants were also asked to identify factors contributing to their stress at the airport (Fig. 24). Crowded terminals were highlighted by 49 respondents as a significant source of stress, followed closely by security checks, which were cited by 48 participants. Delays and cancellations ranked as the third most

stressful factor. Additionally, seven respondents mentioned other reasons for their stress, including the challenges of travelling with children, noise levels, long distances to gates, time management concerns, and enclosed waiting areas lacking windows and natural light (see Appendix 3).

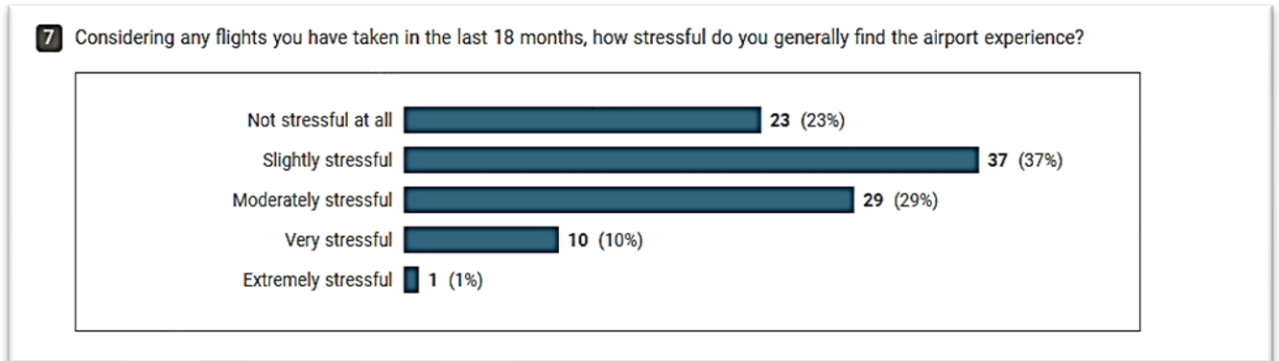


Figure 23. Perception of experiences level of stress at airports

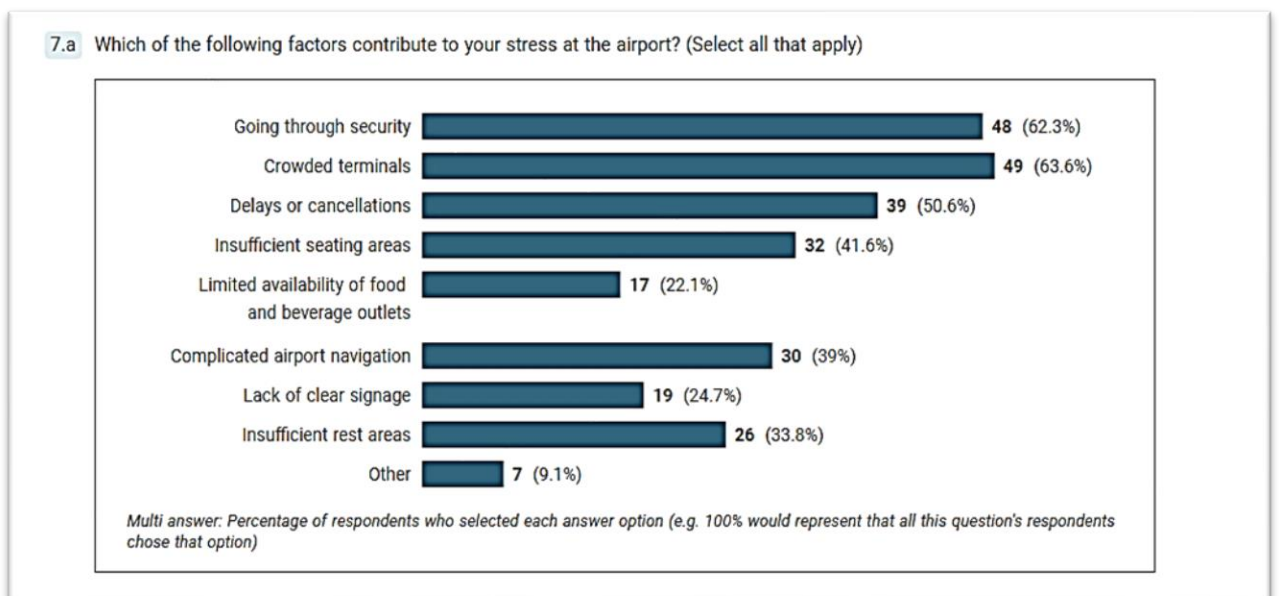


Figure 24. Factors contributing to stress at airports

3.3. Enhancing Airport Experience

Participants were also requested to assess the significance of various features in improving their airport experience. The results are presented below:

- **Access to outdoor areas such as gardens or parks**

33.7% of participants indicated that access to outdoor spaces is not important, while the remaining respondents considered it to be important to varying degrees, ranging from slightly important to very important (see Fig. 25).

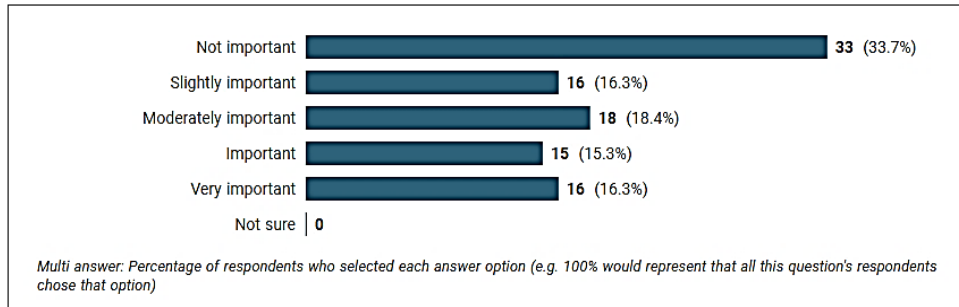


Figure 25. Perceived importance of access to outdoor areas such as gardens or parks

- **Access to restaurants and social spaces**

Access to restaurants and social spaces was regarded as important by nearly all participants, with over 98 individuals rating it from slightly to very important. Only one participant indicated that these spaces were not important to them (Figure 26).

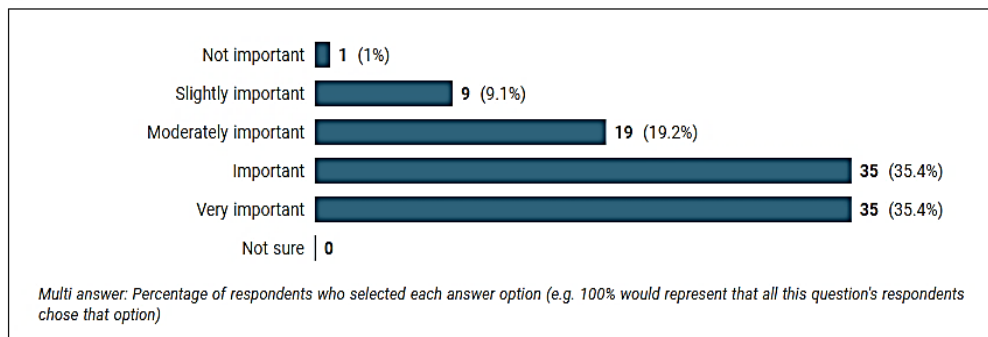


Figure 26. Perceived importance of access to restaurants and social spaces

- **Availability of quiet areas**

Almost half of the respondents (48) considered access to quiet areas at the airport to be either important or very important. Additionally, 26 participants rated them as moderately important, while 15 found them to be only slightly important. Only 7 individuals deemed these areas as not important (see Figure 27).

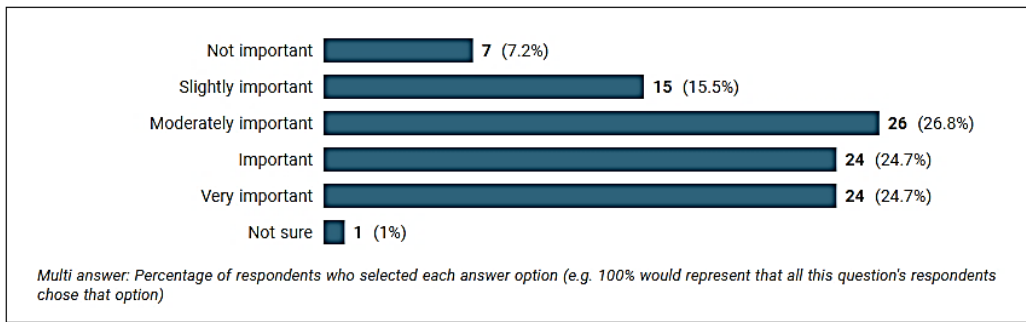


Figure 27. Perceived importance of quiet areas

- **Reliable and high-speed Wi-Fi**

Just under half of the participants (43.9%) rated reliable and high-speed Wi-Fi as very important, while 28.6% considered it important, resulting in nearly 75% of respondents identifying Wi-Fi at the airport as either very important or important. Additionally, 5 participants stated that it was important, and 2 indicated that it was only slightly important (Fig. 28).

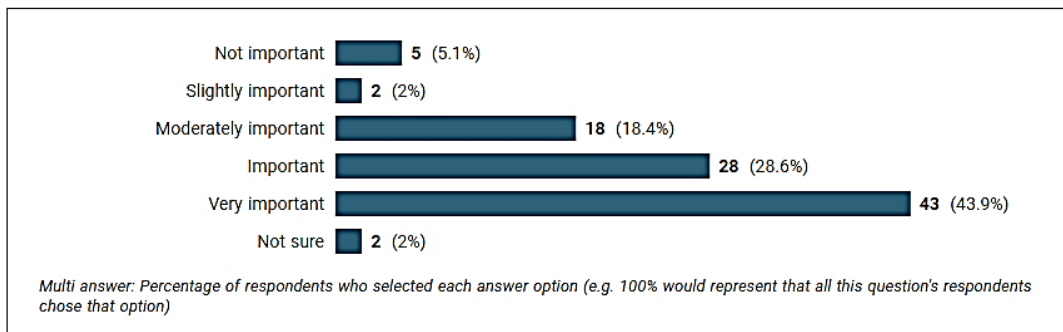


Figure 28. Perceived importance of reliable and high-speed Wi-Fi

- **Availability of activity spaces (such as playgrounds or yoga spaces)**

The data analysis indicates that over half of the respondents (54%) do not view the availability of activity spaces as important. In fact, only 5% considered these spaces to be very important, while 4% rated them as important (see Fig. 29).

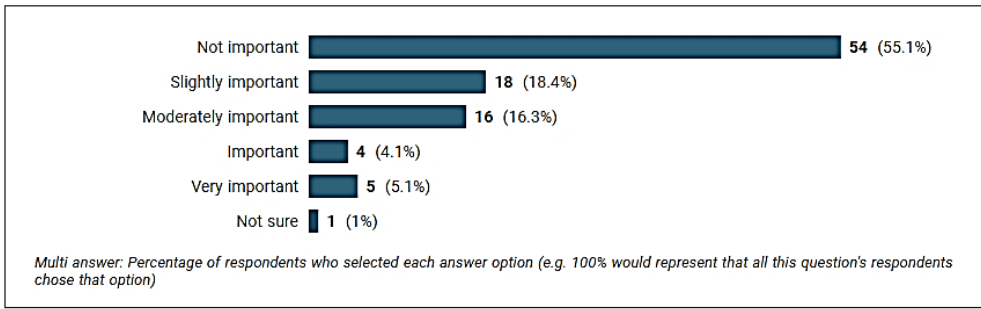


Figure 29. Perceived importance of availability of activity space

- **Clear signage and wayfinding**

As shown in Figure 30, the findings clearly show that 59 out of 100 participants consider clear signage and wayfinding to be very important, while 17 view them as important and 10 as moderately important. Only 2 individuals indicated that it was not important.

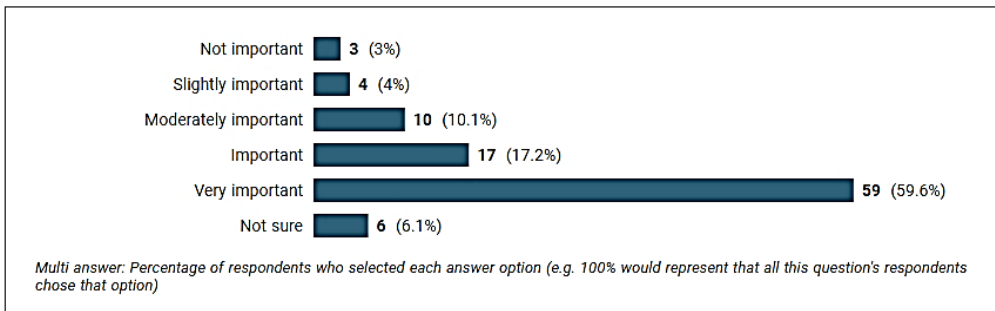


Figure 30. Perceived importance of clear signage and wayfinding

- **Presence of duty-free shopping areas**

The findings show that 18.2% of respondents regard duty-free shops as not important. Conversely, 13.1% consider them very important. Additionally, another 13.1% view them as important, while 28.3% rate them as moderately important.

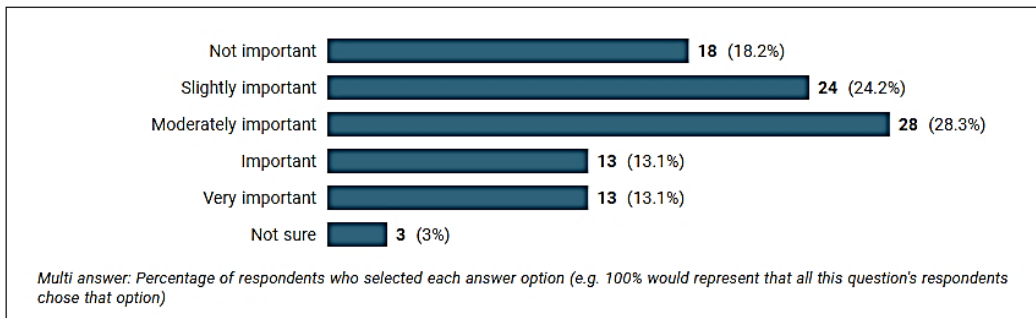


Figure 31. Perceived importance of presence of duty-free shopping areas

- **Dedicated workspaces for using laptops or holding meetings**

A total of 28 participants indicated that dedicated workspaces for using laptops or holding meetings are important to them while at the airport. Among these, 9 people rated them as very important, while 19 considered them important. In contrast, 27 respondents deemed these workspaces as not important (see Fig. 32).

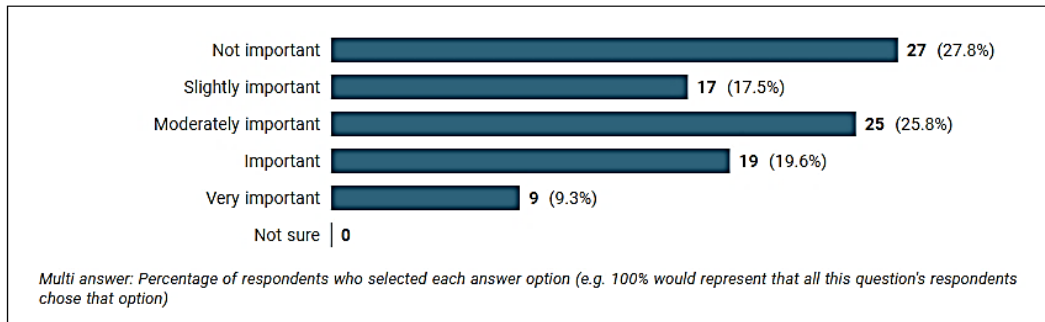


Figure 32. Perceived importance of presence of dedicated workspaces

3.4. Visiting Airports' Green Spaces

Participants were also asked whether they typically visit green spaces at the airport, with the question clarifying that green spaces included outdoor parks, gardens, indoor green areas, and roof terraces. The findings reveal that over half of the respondents (55%) have not encountered any green spaces at airports. Meanwhile, 21% chose not to visit them, while 24% indicated that they do visit these areas (Fig. 33).

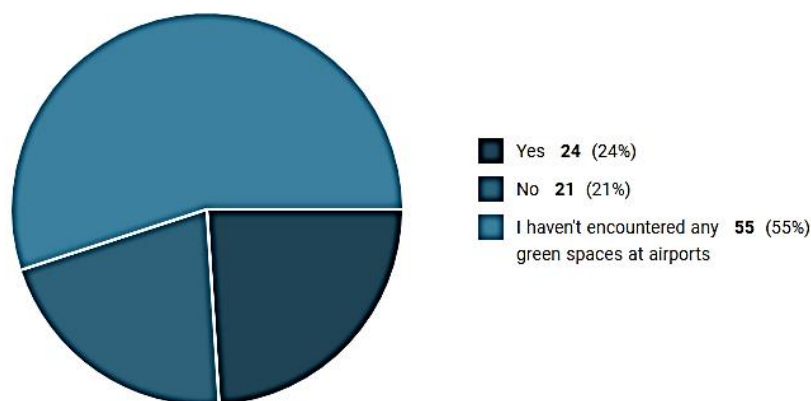


Figure 33. Participants' Interaction with Airport Green Spaces

Participants were asked to provide reasons for their choice to either visit or not visit greenspaces at the airports. Below are the responses from both groups, and two-word clouds were generated in a Word document to visually represent the key themes for each group (see Figures 34 and 35 below).

3.4.1. Reasons for Not Visiting Greenspaces at Airports (Appendix 4)

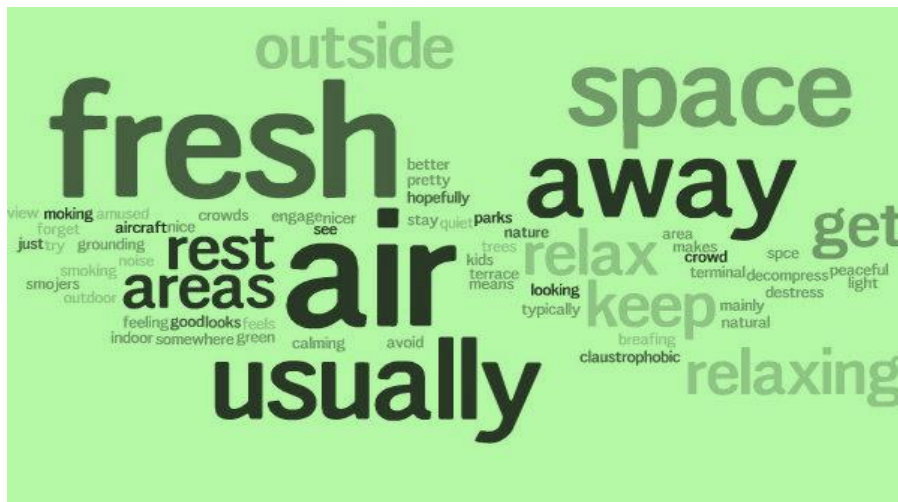
Of the 21 participants who indicated a preference against visiting greenspaces at the airport, 19 provided several reasons that reflect their priorities and preferences. A common theme among responses was the emphasis on practicality and convenience; many respondents indicated that they prioritise amenities such as charging sockets, flight information screens, and proximity to their boarding gate over the availability of green spaces. One participant mentioned that they would choose a greenspace if it included those essential facilities. Several respondents expressed a lack of interest in greenspaces, stating that they do not find them important while at an airport or that they simply do not have the time to enjoy them. Some noted that their focus is primarily on dining, relaxing, or shopping, particularly if they are travelling with children who prefer shops over greenspaces. Others mentioned specific circumstances that influence their decisions, such as being on a business trip, which diminishes the need for outdoor areas. A few participants criticised the greenspaces as being too artificial and stated that if they desired a natural setting, they wouldn't choose to go to an airport. Overall, the responses suggest that for many travellers, the practicalities of airport amenities and the urgency of travel take precedence over the appeal of greenspaces.



*Figure 34. Word Cloud Representation of Responses from Participants **Choosing Not to Visit** Greenspaces*

3.4.2. Reasons for Visiting Greenspaces at Airports (Appendix 5)

Participants who selected that they chose to visit greenspaces at the airport provided a variety of reasons that highlight their desire for relaxation and connection with nature. Many respondents indicated that these areas offer an opportunity to escape the crowds and the noise of the terminal, allowing them to decompress and destress. The peaceful environment was frequently mentioned, with participants appreciating the calmness and beauty of the greenspaces, which often provide a refreshing outdoor view and natural light. Several individuals noted the importance of fresh air, with some specifically wanting to avoid smoking areas that are typically located within these spaces. Families travelling with children emphasised the presence of parks as a way to keep their kids entertained, making greenspaces a more enjoyable experience for everyone. Overall, respondents expressed that visiting greenspaces is a means of relaxation and grounding, contributing to their overall sense of well-being during travel. These areas are perceived as a welcome contrast to the busy airport environment, providing a calming atmosphere that enhances the travel experience.



*Figure 35. Word Cloud Representation of Responses from Participants **Choosing to Visit Greenspaces***

3.5. Participant Ratings on Airport Stress-Reduction Amenities

Participants were asked to rate their agreement with three statements. The first statement addressed whether the availability of animal support services (such as pet relief areas or therapy animals) at airports would significantly reduce stress during their travels. The second statement focused on whether access to gym facilities or designated physical activity areas at airports would contribute to increased relaxation and decreased travel-related stress. The third statement inquired if spending time in designated outdoor spaces at the airport would help them relax more effectively than remaining in indoor security zones. The data analysis revealed the following results:

- **The availability of animal support services**

When questioned about the availability of animal support services at airports, 44.4% of respondents expressed a neutral opinion. Meanwhile, 14 individuals (14.1%) agreed that the presence of animal support services, such as pet relief areas or therapy animals, would significantly reduce stress during their travels, while 13 participants (13.1%) somewhat agreed. Additionally, 10 respondents were uncertain, and in total 18 people disagreed or strongly disagreed with the statement (Fig. 36).

10.1 The availability of animal support services (like pet relief areas or therapy animals) at airports would significantly reduce stress during my travels.

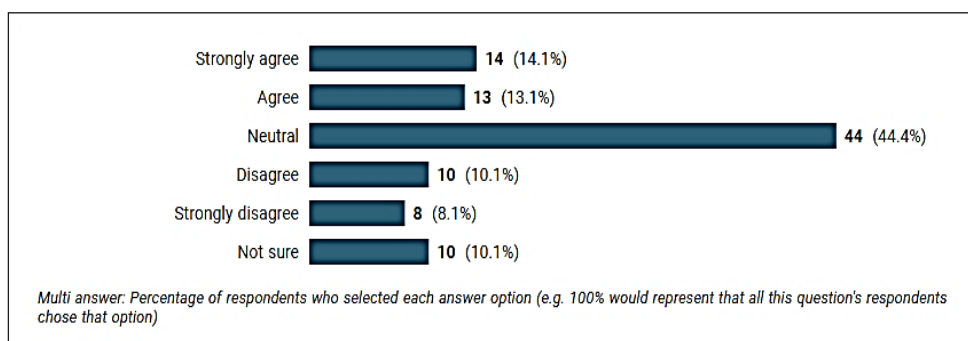


Figure 36. Participants' Perception on Animal Support Services at Airports

- **Access to gym facilities or designated physical activity areas at airports**

When participants were asked about gym facilities or designated physical activity areas at airports, 39 individuals (39.4%) expressed a neutral opinion. Additionally, 8.1% strongly agreed that access to such facilities would contribute to increased relaxation and reduce travel-related stress, while 18.2% agreed. In contrast, 19 participants (19.2%) disagreed, and 11 individuals (11.1%) strongly disagreed with the statement, as presented in Figure 37 below.

10.2 Access to gym facilities or designated physical activity areas at airports would contribute to increased relaxation and reduced travel-related stress.

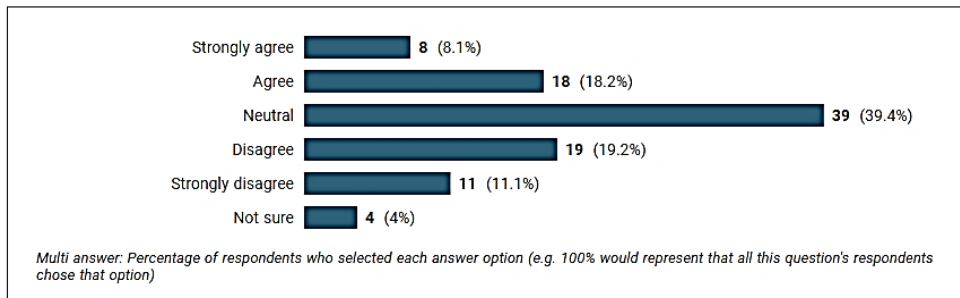


Figure 37. Participants' Perception on Gym Facilities at Airports

- **Spending time in designated outdoor spaces**

As illustrated in Figure 38, a total of 61.5% of participants either strongly agreed or agreed that spending time in designated outdoor spaces at the airport would help them relax more effectively than staying in indoor security zones. Meanwhile, 19.8% expressed a neutral opinion, while 9.4% disagreed and 6.3% strongly disagreed with this statement.

10.3 Spending time in designated outdoor spaces at the airport would help me to relax more effectively than remaining in indoor security zones.

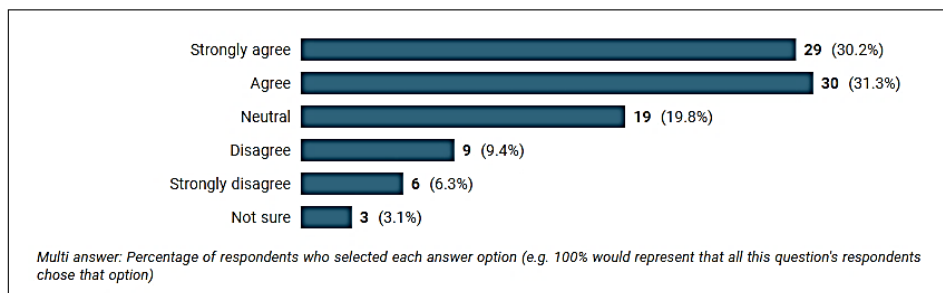


Figure 38. Participants' Perception on Designated Outdoor Spaces at Airports

3.6. Perception on restorative qualities of visited airports

Participants have reported flying from a diverse array of airports across various countries, including prominent international hubs such as Hamad International Airport (Doha), Changi Airport (Singapore), and Heathrow (London). Numerous UK airports were also frequently mentioned, including London Luton, Glasgow International, Manchester, and London Gatwick. Notably, Edinburgh Airport was cited multiple times, likely because the researcher designed this survey in Edinburgh, where she also resides. The following assessment of the restorative qualities of airports is informed by the airport’s participants have visited.

Respondents were asked to evaluate the restorative qualities of the airport they had last flown from. The definition of restorative qualities was provided, explaining that these encompass features such as quiet lounges, green spaces, comfortable seating areas, and other amenities aimed at alleviating travel-related stress. These qualities are designed to enhance the overall passenger experience by promoting relaxation and comfort, thereby contributing to a more positive travel environment. Notably, 30% of participants indicated that the airports were not restorative at all, while 25% rated them as slightly restorative and 27% as moderately restorative. Only 3% found the airports to be very restorative, and an additional 3% rated them as highly restorative. Twelve individuals were uncertain about their assessment (Fig. 39).

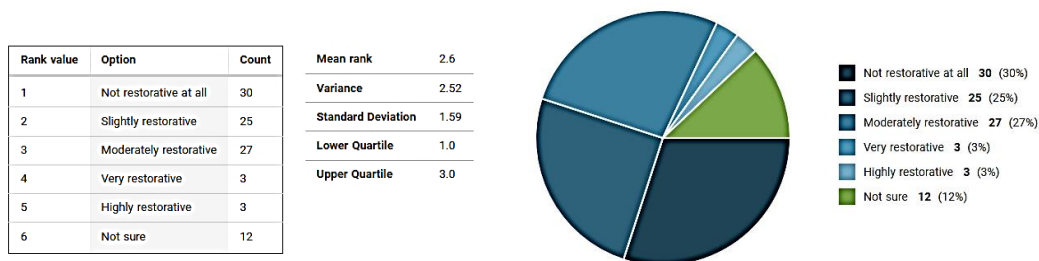


Figure 39. Participants’ Perception on restoration level of the visited Airports

3.7. Participants' Suggestions for Enhancing Airport Experience

To gain insight into travellers' views on potential improvements and additions to enhance their airport experience, I included an open-ended question in the survey. Participants were asked to suggest improvements or additions that might make their airport experience less stressful and more relaxing. To clarify the concept of "restorative qualities" in an airport context, I provided a definition in the survey. This explanation highlighted aspects such as quiet lounges, green spaces, comfortable seating areas, or any amenities designed to alleviate travel-related stress and improve the overall passenger experience by promoting relaxation and comfort. To manage and analyse the large volume of qualitative responses, I used Leximancer, a software tool designed to identify and organize frequently occurring words and phrases within text data. The Leximancer was used as follows:

1. Initial Identification of Themes

I input the open-text responses from participants into Leximancer⁸, which then analysed the data by identifying recurring terms based purely on frequency and proximity. This tool-generated analysis produced a preliminary list of five common terms: *spaces*, *areas*, *security*, *seating*, and *possible solutions*. Leximancer then automatically mapped these terms into a visual concept map, grouping related terms based on word frequency and association (see Figure 40).

2. Tool-Led Mapping, Followed by Researcher Interpretation

It's important to note that the concept map and theme suggestions were generated entirely by Leximancer as a starting point, based on word patterns alone, without any interpretation or deeper context analysis. I used this output as an initial framework but did not rely on it as the final analysis.

3. Refinement of Themes

After reviewing the tool-generated themes, I refined them to better represent the actual content and context of participants' responses. For example, I combined *spaces* and *areas*

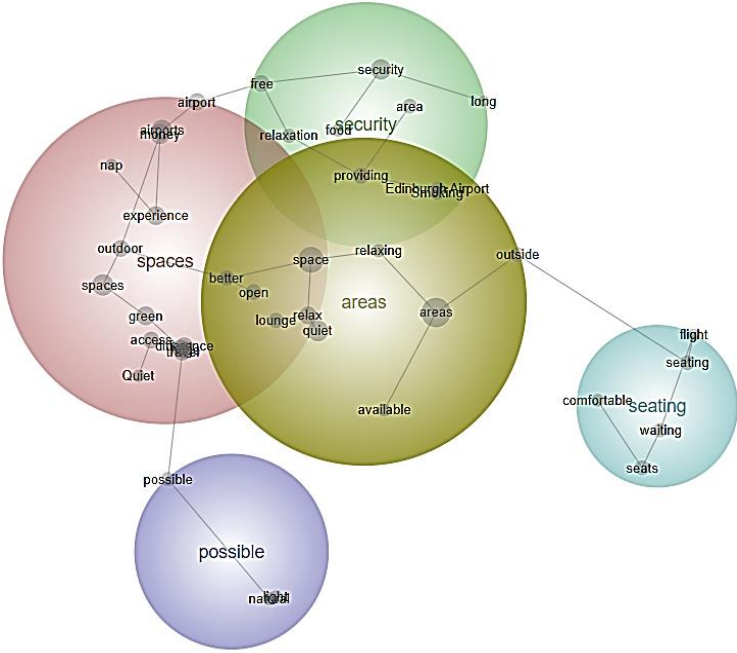
⁸ <https://www.leximancer.com/>

into a single theme— *Airport Spaces and Areas*—because participants often discussed these terms interchangeably when referring to open, comfortable, or designated spaces in the airport. I also clarified *possible solutions* as a theme encompassing a range of specific suggestions from participants for improving the airport experience.

The final set of themes, therefore, reflects both Leximancer’s initial identification of common terms and my interpretation of the data based on the content and intent behind participants’ responses. The final themes guided my analysis, ensuring that the themes accurately captured the key aspects of participants’ feedback, and included the following:

Theme 1: Airport Spaces and Areas **Theme 2:** Airport Security

Theme 3: Airport Seating Options **Theme 4:** Possible Other Solutions



Analyst Synopsis		Detail Level	Export
Theme	Hits		
areas	31		
spaces	27		
security	23		
seating	15		
possible	5		

Figure 40. Leximancer Concept Map: Participants’ Suggestions for Enhancing Airport Experience

Based on the identified themes, the findings are presented below:

Theme 1: Airport Spaces and Areas

Green and Privacy Spaces: Many participants highlighted the importance of incorporating more natural elements, such as gardens, outdoor seating areas, large windows, and green spaces, particularly after security checks. They suggested that these features would create a more calming atmosphere and enhance overall well-being:

“Information that is readily available about green spaces or outdoor facilities. Ideally if this information can be shared when you purchase the air ticket, it would help in planning ahead. Typically, outdoor green spaces within airports are rather open. Perhaps, more individually secluded spaces that provide better sense of refuge and privacy would be ideal”

“Larger windows and sky lights to allow as much natural light as possible, high concourse ceilings.”

“More private areas...”; “More quiet areas and green space...”; “Designated Reading areas...”.

“Inverness with all its windows and views out and lots of seating was very stress reducing”.

“More green spaces would be lovely Montreal has a decent amount of plants didn't feel too crowded”.

Relaxation Areas: Respondents suggested creating dedicated relaxation zones, similar to those found in airports like Amsterdam Schiphol and Singapore Changi, where travellers can decompress away from crowded areas. Features such as quiet workspaces and nap areas were also recommended:

“More relaxing space like Amsterdam...”; “Changi airport Singapore would be the best practice for restorative airport experience, with gardens and artificial waterfall”.

Smoking Areas: Few participants highlighted the lack of smoking areas at visited Airports:

“Smoking areas either by providing inside room or outside space, after passing the security. Also, more space for sitting and quiet areas (Edinburgh Airport)..”

“More seating, being able to get outside, smoking areas..”

Theme 2: Airport Security

Improved Security Processes: Numerous participants expressed frustration with security checks, indicating that quicker queues and more efficient processes would significantly reduce stress levels. Suggestions included clearer signage and a more standardised approach to security checks across different airports:

“Less crowding, calmer security experience, more spaces for having a quick nap...”;
“More open areas and timeframes for how long it takes to go through security”

“Less que. Quicker security check...”.” *Sort out the crazy queues at security. Be consistent. Why is security quite relaxed in some and not in others?”*

Theme 3: Airport Seating Options

Enhanced Seating Options: Several responses highlighted the need for additional seating areas throughout the airport, especially outside cafes and in quieter zones. Comfortable and abundant seating was noted as crucial for relaxation, particularly in busy terminals:

“Plenty of seating whilst waiting for your flight. More water refill stations...”

“More seats available in waiting areas.”

Theme 4: Possible Other Solutions

Food and Beverage Options: Participants emphasised the importance of offering a wider variety of reasonably priced dining choices, including healthier options. The quality of food service should also be improved, with a preference for using real crockery rather than disposable items:

“Cheaper food options, quieter areas to sit and relax. London City is a relaxing airport.”

“More availability of gluten free food.”

Engaging Features and Physical Activity Spaces: Few passengers mentioned incorporating attractions like waterfalls, slides, or climbing walls, and designing areas that promote physical activity, such as fitness stations or walking paths:

“Having interesting features such as the waterfall or slides in Singapore, the outdoor rainforest in Kuala Lumpur or the climbing wall in Dubai would help to make airports more pleasant. Filling them with shops and expensive bars pits me off spending any money at all”.

Family-Friendly Facilities: There was a call for more facilities designed for families, such as children's playgrounds and dedicated changing or feeding rooms.

Efficient Information and Communication: Suggestions were made to provide real-time updates on gate locations, travel times, and available services.

Enhanced Accessibility: Several participants highlighted the necessity for improved services for disabled passengers, including clear signage and additional support to facilitate navigation through the airport:

“Offering better services and more time for disabled people...”

Amenities for Stress Relief: Respondents noted the potential advantages of integrating features like therapy animals, calming music, and quiet areas to foster relaxation and minimise stress during their airport experience:

“More money spent by the airports on providing a free area less retail more relaxation areas.”;

“I think more relaxation points, chairs, and more comfortable chairs..”

“More money spent by the airports on providing a free area less retail more relaxation areas...”.

4. Discussion

The discussion chapter is organised into three distinct sections, each corresponding to one of the research questions. This structure allows for a thorough exploration of the findings and their implications. Each section will address the specific insights gained from the study findings, reflecting on how they relate to the overall aims of the study and the existing literature. In the first section, I will focus on identifying the factors that travellers find most stressful in airport environments. By examining these stressors, we can better understand how to mitigate them and create a more supportive atmosphere for passengers. The second section will highlight the most valued elements of airport design that travellers perceive as restorative and how these features contribute to enhancing the overall travel experience. Finally, the third section will present recommendations for airport design based on the study's findings, emphasising how these changes can foster a more restorative environment for travellers.

4.1. Source of Passengers' Stress at Airport Environments

RQ.1. What factors do travellers identify as most stressful in airport environments?

The results of this study regarding participants' perceptions of stress at airports align with existing literature that highlights the inherently stressful nature of these environments. A substantial 77% of respondents reported experiencing some level of stress during their airport visits, reinforcing previous studies that indicate airports can be sources of anxiety and discomfort for travellers (e.g. McIntosh et al., 1998). The diverse range of stress levels stated—from slightly to extremely stressful—demonstrates the variability in individual experiences, which can be influenced by personal factors and situational contexts (e.g. reasons for travel, familiarity with the visited airport, etc.). Participants identified several key factors contributing to their stress, with crowded

terminals being the most significant concern. This aligns with the findings of study by Zhang et.al (2023), who highlighted that overcrowding in urban spaces can lead to heightened stress levels. The anxiety and stress associated with crowded environments is compounded by the urgency often felt in airport settings, as travellers navigate time-sensitive situations. Furthermore, security checks emerged as another major source of stress. The literature consistently highlights the anxiety induced by security procedures, which can be particularly unsettling for nervous flyers (Bricker, 2010). Additionally, the possibility of delays and cancellations intensifies travellers' stress, supporting the findings of Peters et al. (2007), who noted that uncertainties can greatly affect emotional well-being. Interestingly, in my study, few respondents mentioned additional stressors, such as travelling with children, high noise levels, long distances to gates, time management issues, and enclosed waiting areas devoid of windows and natural light. These factors reflect a broader understanding of airport environments, as highlighted by Ulrich (1991), who found that aspects such as natural light and open spaces can positively influence stress recovery and overall well-being. The absence of these restorative features in airport design may contribute to the heightened stress levels reported by participants

4.2. Restorative Features of Airport Design at Airports

RQ.2. What are the key features of airport design that travellers perceive as most restorative?

In addition to assessing specific restorative features within airports, participants were asked about restorative activities they find beneficial in their daily lives. By integrating elements that align with these restorative activities, airports can create environments that better cater to travellers' needs. While it is crucial to consider this connection thoughtfully—acknowledging that not all daily restorative activities can be directly applied to an airport environment—the insights gathered can still inform the creation of features that enhance a sense of well-being. The top three activities identified by participants were socialising with friends and family (68%), spending time outdoors (58%), and listening to music (43%). These findings highlight the significance of social connections and access to nature in promoting well-being, suggesting that airport environments could be improved by incorporating elements that facilitate social

interaction and provide natural features. Additionally, 25% of respondents of my study indicated that watching movies is a restorative activity. This preference for passive entertainment suggests that incorporating multimedia options in airport lounges or waiting areas could assist travellers in relaxing and engaging with familiar content, thereby creating a more welcoming atmosphere especially during longer waiting periods.

Participants were asked to assess the importance of the following features for enhancing the restorative aspects of your airport experience: access to outdoor areas such as gardens or parks; access to restaurants and social spaces, availability of quiet areas; reliable, high-speed Wi-Fi; availability of activity spaces (e.g., playgrounds, yoga spaces); clear signage and wayfinding; availability of duty-free and shopping areas, and dedicated workspaces for using laptops or holding meetings. The results indicated that 33.7% of respondents considered access to outdoor spaces unimportant. Nevertheless, the majority recognised these areas as valuable to varying degrees, ranging from slightly to very important. This variation in perceptions suggests that while a considerable number of travellers may not prioritise outdoor access, there is still a significant group that appreciates these spaces for their potential to enhance the overall airport experience. The value of outdoor areas aligns with the need for restorative environments, which research has shown can help reduce stress and improve well-being. This is consistent with previous research indicating that green spaces can have a positive impact on mental well-being and alleviate stress in crowded settings (Kaplan & Kaplan, 1989). Nevertheless, the varied perceptions suggest that there may be a need to further investigate how outdoor spaces are incorporated into the airport experience, and how are they utilised by the passengers.

Interestingly, the findings of my study indicate a strong consensus among participants regarding the importance of access to restaurants and social spaces in airports. This highlights that travellers value opportunities for social interaction and dining during their airport experience. This aligns with existing literature that highlights the role of natural environment and social connectedness in enhancing well-being and reducing stress while travelling (Fiorillo & Gorwood, 2020; Olafsdottir et al., 2020; Chang et al., 2024). Based on the findings, I believe that airports should create more areas that promote social interaction, such as communal seating arrangements, lounges, and spaces with scenic views. In addition, more restaurants could incorporate greenery and natural elements into their designs, recognising that not everyone may be inclined to seek out natural spaces, and decide to visit green spaces while at the airport. Given that restaurant spaces are

among the most frequented areas and are recognised as important for restoration and relaxation, as this study suggests, this approach could significantly enhance the overall airport experience. By bringing nature to people in these highly visited airport spaces, rather than expecting from every traveller to seek out natural environments elsewhere, airports can create a more calming and inviting atmosphere that benefits all passengers.

Furthermore, the findings of this study reveal that nearly half of the respondents consider access to quiet areas in airports as important or very important for their restoration. This significant interest indicates a strong demand for spaces where travellers can escape the noise and chaos typically associated with airport environment. While it is naturally challenging to eliminate noise and announcements in an airport due to its operational demands, some areas could be designed to reduce sound levels. In these spaces, it would be beneficial to ensure that essential flight information and technology remain accessible, helping to ease concerns about missing a flight. Additionally, airports should focus on making quiet spaces easily accessible by implementing clear signage that directs travellers to these areas. Enhancing these quiet zones with amenities such as charging stations, reading materials, and calming music could further improve the overall experience for passengers seeking relaxation.

Moreover, the findings underscore the essential importance of clear signage and effective wayfinding in improving the airport experience. This strong preference highlights the need for airports to prioritise navigational aids, as clear signage can greatly alleviate confusion and anxiety for travellers. When passengers can navigate easily, they are more likely to feel in control of their journey, leading to a more positive overall experience and greater potential for restoration. Airports should concentrate on improving the visibility and clarity of signage throughout the terminal by using large fonts, contrasting colours, and intuitive symbols that are easily comprehensible. In addition, integrating digital displays that provide real-time information about gate changes, flight statuses, and other relevant updates can enhance the overall airport experience.

In addition, the results indicate a diverse range of opinions on the importance of duty-free shops within the airport experience. Specifically, 18.2% of respondents found these shops *unimportant*, while 13.1% rated them as *very important*, and another 13.1% deemed them *important*. Additionally, 28.3% classified them as *moderately important*. This suggests that while duty-free shopping is valued by some travellers as a restorative experience that could reduce stress, a significant portion does not prioritise these retail spaces. This variation underscores the need for airports to recognise that duty-free shops

may not appeal to all passengers. While they provide opportunities for tax-free purchases and unique items, not everyone is inclined to engage with these spaces. Enhancing the layout and aesthetics of duty-free shops, including the integration of relaxation zones or biophilic design, can make them more inviting. Given their importance for traveller expenditure, airports should consider these factors in their retail strategies.

Finally, when combining the *important* and *very important* responses, the findings indicate that the most restorative features identified by participants are: clear signage and wayfinding (76 respondents), reliable high-speed Wi-Fi (71), and access to restaurants and social spaces (70). This means that access to outdoor areas and gardens, as well as quiet spaces, were considered less important and viewed as less restorative compared to these three features. This trend may reflect the practical needs of travellers who prioritise navigation, connectivity, and social interaction over more serene environments. Thus, this study highlights that in a fast-paced airport setting, clear signage and reliable Wi-Fi are essential for reducing stress and enhancing the overall travel experience. In addition, access to restaurants and social spaces at airports allows for social engagement which can also be crucial for restoration and stress reduction. In contrast, the availability of activity spaces—such as playgrounds and yoga areas—was deemed important or very important by only 9 participants. This category received one of the lowest scores, alongside the availability of duty-free and shopping areas, which garnered attention from 28 participants, and dedicated workspaces for laptops or meetings, which attracted 26 responses. This suggests that, while these features may hold some value for restoration and stress reduction, they were not prioritised by the majority of travellers, particularly among leisure passengers rather than business ones.

4.3. Recommendations

RQ.3. *What recommendations can be made to enhance the restorative aspects of airport spaces based on the study's findings?*

Some recommendations were detailed earlier (on pages 57, 58, 59), so this section will offer a brief discussion in relation to the existing literature. As noted before, participants had the opportunity to share their ideas for enhancements or additions that could improve their airport experience, reducing stress and promoting a more restorative environment.

The primary themes identified in the analysis focused on state of airport areas and spaces, including airport security. Many respondents emphasised the need for more green spaces and private areas within lounges. Although, as above mentioned, green spaces were not ranked as the most restorative features compared to aspects like wayfinding or access to restaurants, the participants' recommendations clearly indicate that adding green spaces—particularly through biophilic design—would enhance their well-being. In addition, participants also highlighted the necessity for improved amenities for stress relief, particularly for disabled passengers. This includes clear signage and additional support to facilitate navigation through the airport and foster a calming atmosphere. Many suggested increasing natural light through larger windows, creating outdoor spaces for plane spotting, incorporating more plants, and establishing quieter areas to mitigate crowding. It is evident that many travellers, despite the hectic airport environment, expect opportunities to relax before their flights. Some participants mentioned that smoking areas are crucial for their restoration, which is not surprising given that many people smoke when feeling stressed or anxious. A common recommendation was for more seating options at airports, with several individuals advocating for increased seating and fewer retail shops. While this may not always be practical for airport operations, especially regarding revenue generation, it is noteworthy that passengers perceive retail as sometimes prioritised over their well-being and basic needs. Another significant concern raised by many respondents was airport security, which was identified as one of the most stressful airport areas. This suggests that airports need to rethink their security processes; perhaps implementing calming music or biophilic design elements could be effective solutions. Moreover, participants also stressed the importance of expanding food and beverage options, advocating for a wider variety of reasonably priced dining choices, including healthier and gluten-free options. Additionally, there was a call for more family-friendly facilities, such as children's playgrounds and dedicated changing or feeding rooms, which would greatly reduce stress for families travelling with young children. Furthermore, airports should strive to balance the needs of both leisure and business travellers, recognising that each group has distinct requirements. The increasing trend of *bleisure travel*—where business and leisure blend—emphasises this need. The varying importance placed on workspaces suggests that airports must accommodate diverse traveller preferences. While some travellers value dedicated workspaces, others prioritise relaxation areas. Airports could enhance the travel experience by integrating relaxation and work zones, allowing travellers to transition seamlessly between work and

relaxation. Finally, suggestions were made to enhance efficient information and communication, with participants recommending more frequent real-time updates on gate locations, travel times, and available services. This information would assist travellers in navigating the airport more effectively and help alleviate anxiety. As noted in the literature, providing more information about the location of green spaces can enhance their overall appeal and reduce the psychological distance to these areas (Wan et al., 2021). Overall, the multitude of ideas presented highlights that there is significant room for improvement in airport design. By aligning architectural choices with traveller needs and incorporating restorative elements, airports can enhance the overall travel experience and create environments that prioritise restoration.

4.4. Conclusion and Final Remarks

The findings of this study provide a preliminary exploration into how airport environments can impact traveller well-being and stress, highlighting potential paths for creating more restorative and supportive spaces. While these insights offer a foundation for future airport design enhancements, the scope of this study is limited, and it does not aim to prescribe definitive solutions or broadly change airport design practices. Rather, this study offers suggestions that may be valuable for further research and design considerations, acknowledging that restorative qualities in airport settings are inherently subjective and vary widely among individuals. While this study suggests that airports could be more than mere transit hubs, it is essential to recognise that restorative spaces and stress-relieving amenities will vary in effectiveness based on individual preferences. For example, while some travellers might find comfort in quiet lounges or green spaces, others may seek relief in less traditional spaces like smoking areas, underscoring the subjectivity of restorative experiences.

Based on the findings and existing literature, several key insights are suggested:

1. **Airports' Dual Role in the Travel Experience:** Airports can increasingly serve as both transit points and integral parts of the travel journey. According to Wattanacharoensil et al. (2006), airports can enhance the travel experience by serving as both *providers* of experiences and *facilitators* of meaningful connections. By incorporating local cultural elements, physical settings, and

interactive spaces, airports have the potential to cultivate a sense of place and foster positive social interactions. These design choices may allow travellers to collaboratively shape their experiences and feel a deeper connection to the local context. Singapore Changi Airport, for instance, exemplifies this potential, attracting travellers who choose longer layovers to enjoy the airport's amenities. While few airports may match Changi's scope or budget, this illustrates how airport environments can impact travellers' experiences positively, particularly when designed with the local culture and unique amenities in mind.

2. **Focus on Passengers, with Potential Benefits for Staff:** Although this study primarily focused on passengers, there is value in considering how restorative airport spaces might benefit staff as well. While exploring the specific needs of airport workers was beyond this study's scope, from personal experience and observations I suggest that creating supportive environments for employees could also improve passenger experiences indirectly, as staff are essential to airport operations. Further studies could examine how design features impact staff well-being, particularly given the demanding and sometimes stressful nature of airport work
3. **Environmental Considerations and Broader Applications:** It is also crucial to consider the environmental impact of air travel. This study does not intend to promote increased flying or suggest that airports should primarily and solely be viewed as tourist destinations. Instead, the focus is on creating more supportive environments for those who need to fly, whether for work, family obligations, or other unavoidable reasons. Additionally, these findings on restorative design could have relevance beyond airports, offering potential benefits to other, more sustainable modes of transportation, such as train stations and bus terminals. There is limited research on restorative spaces in these settings, and future studies could explore how similar design principles might improve travellers' well-being in more environmentally friendly contexts.

In summary, as air travel remains a significant part of modern life for many, airport design will likely continue to evolve. Collaboration between urban designers, airlines, airport operators, and stakeholders—including staff and passengers—will be essential in shaping airport environments that prioritise well-being while adapting to future demands and sustainability considerations.

4.5. Limitations and Future Research

This study has its limitations. Firstly, while data was gathered from 100 participants, this sample size may restrict the generalisability of the results. While this study provides initial insights into enhancing the restorative qualities of airport spaces, further research with a broader scope and more diverse participant samples would be necessary to fully understand and address the varied needs of travellers, improving the reliability of the findings. Secondly, it's important to consider contextual factors that could affect participants' experiences at airports. This study may not account for external influences such as travel delays, personal circumstances, time spent at the airports, or varying conditions at different airports, all of which could impact perceptions of restorative features and overall well-being. Additionally, it's crucial to acknowledge that my previous work at the airport may introduce a degree of bias in the interpretation of the data and findings. This background could influence my perspectives on the significance of various airport features. Lastly, we must recognise the limited scope of features explored in this study. Although various aspects of airport design were examined, there may be additional elements contributing to a restorative experience that were not included in this research. Thus, future studies should aim to investigate a wider array of design feature.

Furthermore, future research can enhance our understanding of how airport design impacts traveller's well-being and can help establish best practices for creating restorative environments. It should specifically evaluate the effects of the restorative features identified in this study on traveller stress levels and overall airport experience. This could include investigating the relationship between features like green spaces, social spaces, and quiet zones and their influence on passenger well-being. Exploring differences in perceptions of restorative airport features based on demographic factors such as age, gender, and frequency of travel could be insightful. Additionally, more research is needed to understand how to encourage greater use of greenspaces and other designated areas within airports. This might involve identifying barriers that deter travellers from utilising these spaces and exploring strategies to promote their benefits, such as improved signage, information campaigns, or enhanced accessibility. Furthermore, studies could investigate the potential advantages of animal support services, like therapy animals, in reducing stress and improving the overall airport experience. The findings of the current study provide a modest foundation for these future studies.

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“Nature is the most information-rich and intellectually stimulating environment that people ever encounter”.

(Kellert 2008, p.14)

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Appendix 1

Comparing Mass Tourism to Slow Tourism (Source: Moira, Mylonopoulos, and Kondoudaki, 2017)

<i>Mass Tourism</i>	<i>Slow Tourism</i>
Quick movement	Slow movement
The airplane is the dominant means of transport, mainly charter flights	Use of alternative means of transport, mainly train or bus
Transportation with high carbon dioxide emissions	Transportation with low carbon dioxide emissions
Speed	Slow pace
The trip coincides with the movement	The movement is part of the journey
Visit to numerous tourist attractions	Perceive to local character of the place
Quantifying the visiting areas	Qualifying the tourist experience – maximizing the enjoyment of the destination
Passive tourist	Active tourist
Standardized experiences	Authentic experiences
Standardized food services (catering style)	Local and traditional type of diet
Impersonal acquaintance and low contact with the place and its residents	Substantial contact and real communication with the destination and its residents
Accommodation in commercialized resorts or hotel complexes	Accommodation in small accommodation units
Group options, lack of flexibility	Individual options, flexibility
Hostage – omnipresence of the communication technologies during holidays	Getting rid of the communication technologies during holidays
Continuous contact with the workplace	No contact with the workplace

Appendix 2

The questionnaire utilised in this research study

Part 1: Introduction of the study

Thank you for dedicating your time to participate in this survey. Your insight will contribute to ongoing research conducted by a Master's student in Environmental Psychology at the Swedish University of Agricultural Sciences.

If you've travelled by plane in the last 18 months, you're eligible to participate.

This research aims to gain a deeper understanding of travellers' perceptions and preferences regarding restorative environments at airports. Your feedback is very valuable in identifying restorative aspects of airport settings, and suggesting new ways through which airports can enhance travellers' health and well-being. Please note that your involvement is voluntary and that all data collected will remain anonymous. By completing this survey, you consent to the use of your responses for research purposes.

Completing this survey should take less than 5 minutes of your time. Your honest responses are highly valued.

Thank you once again for your participation.

Part 2: Demographic Information

1. Please select your gender:

- Male
- Female
- Other
- Prefer not to say

2. Which of these age bands do you fall into?

- 18-24

- 25-34
- 35-44
- 45-54
- 55-64
- 65+

3. How frequently do you travel by air?

- More than once a month
- Monthly
- Every 2-3 months
- Every 4-6 months
- Once a year
- Less than once a year
- Not sure

4. Reflecting on the flights you took over the last 18 months, what was the primary reason for your travel?

- Mostly business
- Mostly leisure
- A mix of both business and leisure

5. Please select the top three activities or environments that you find most restorative in your daily life. *Please select no more than 3 answer(s).*

- Spending time outdoors (e.g., parks, gardens)
- Engaging in physical exercise (e.g., running, yoga)
- Engaging in artistic activities (e.g., painting, crafting)
- Socialising with friends and family
- Practicing mindfulness or meditation
- Listening to music
- Reading books
- Playing video games
- Watching movies
- Other

5.a. If you selected Other, please specify:

Part 3: Airport Experience

6. Considering all the airports you have visited in the last 18 months, which areas did you find most conducive to rest and relaxation? Please select your top three options.

- Restaurants or cafes
- Quiet zones
- Airport Lounges
- Green spaces (such as indoor gardens, living walls, plant displays, or landscaped outdoor sections)
- Meditation or prayer rooms
- Entertainment venues
- Duty-free shopping
- Not sure
- Other

6.a. If you selected Other, please specify:

7. Considering any flights you have taken in the last 18 months; how stressful do you generally find the airport experience?

- Not stressful at all
- Slightly stressful
- Moderately stressful
- Very stressful
- Extremely stressful

7.a. Which of the following factors contribute to your stress at the airport? (Select all that apply)

- Going through security
- Crowded terminals
- Delays or cancellations
- Insufficient seating areas
- Limited availability of food and beverage outlets
- Complicated airport navigation
- Lack of clear signage
- Insufficient rest areas
- Other

7.a.i. If you selected Other, please specify:

8. Please rate the importance of the following features for enhancing the restorative aspects of your airport experience. Please select no more than one answer per row

	<i>Not Important</i> (1)	<i>Slightly Important</i> (2)	<i>Moderately Important</i> (3)	<i>Important</i> (4)	<i>Very Important</i> (5)	<i>Not sure</i> 0
Access to outdoor areas such as gardens or parks						
Access to restaurants and social spaces						
Availability of quiet areas						
Reliable, high-speed Wi-Fi						
Availability of activity spaces (e.g., playgrounds, yoga spaces)						
Clear signage and wayfinding						
Availability of duty-free Shopping areas						
Dedicated workspaces for using laptops or holding meetings						

9. When available, do you typically visit green spaces at airports?

(Greenspaces can include but are not limited to outdoor parks, gardens, indoor green areas, roof terraces, etc.)

- Yes
- No
- I haven't encountered any green spaces at airports

9.a. Please explain why you choose not to visit airport greenspaces.

.....

9.b. Could you please describe why you choose to visit greenspaces at airports?

.....

10. Please rate your agreement with the following statements

(Please don't select more than 1 answer(s) per row).

	<i>Strongly Agree</i>	<i>Agree</i>	<i>Neutral</i>	<i>Disagree</i>	<i>Strongly Disagree</i>	<i>Not sure</i>
The availability of animal support services (like pet relief areas or therapy animals) at airports would significantly reduce stress during my travels.						
Access to gym facilities or designated physical activity areas at airports would contribute to increased relaxation and reduced travel related stress.						
Spending time in designated outdoor spaces at the airport would help me to relax more effectively than remaining in indoor security zones.						

11. What was the last airport you flew out from?

.....

11.a. How would you rate the restorative qualities of the airport you last visited?

(Restorative Qualities: in the context of an airport, these could include aspects like quiet lounges, green spaces, comfortable seating areas, or any facilities designed to reduce travel-related stress and enhance the overall passenger experience by providing relaxation and comfort).

- Not restorative at all
- Slightly restorative
- Moderately restorative
- Very restorative
- Highly restorative
- Not sure

Part 4: Suggestions and Final Remarks

12. What improvements or additions could make your airport experience less stressful and/or more restorative? Feel free to mention specific airports if you have examples of good practices.

.....
.....

Part 5: Final Page

Thank you for contributing to this research! We greatly appreciate your time and cooperation in completing this survey.

For any query or questions regarding this research study, please contact the author of the study: Doriana Chodor at docr001@stud.slu.se.

Appendix 3

Additional Percieved Source of Stress at Airports

7.a.i If you selected Other, please specify:

Showing all 7 responses Show less	
The whole having to be on time for everything and the chance of getting lost, losing a bag not finding a seat, managing the children.	1145876-1145858-123692118
Noise	1145876-1145858-123701202
Enclosed windowless waiting spaces or with limited window area	1145876-1145858-123702419
Travelling with family & kids	1145876-1145858-123703820
Managing time	1145876-1145858-123706647
Long walks to gates	1145876-1145858-123706870
Children	1145876-1145858-123708590

Appendix 4

Participants' Reasons for Not Visiting Greenspaces at Airports

9.a Please explain why you choose not to visit airport greenspaces.

Showing all 19 responses Show less	
I think sockets to charge my phone and an infoscreen of the flights are more important, being close to the gate is of priority as well. If a green space has those three factors then I will choose the green space over the other space.	1145876-1145858-123690896
Didn't see many	1145876-1145858-123691287
Don't think it is important while at an airport	1145876-1145858-123694290
No time	1145876-1145858-123699349
Don't really care	1145876-1145858-123699765
Proximity to where I live	1145876-1145858-123697873
Am content just to dine and relax with a book in the lounge pre flight	1145876-1145858-123702709
because I travel with children and they don't want to go there, they prefer shops	1145876-1145858-123703534
Just want to get on the plane.	1145876-1145858-123704969
If I'm on business trip I don't need park or green space ,	1145876-1145858-123705052
Not an outdoors person	1145876-1145858-123706444
Not a priority	1145876-1145858-123706476
Too artificial	1145876-1145858-123706870
If I wanted a green space I won't go to the airport	1145876-1145858-123707323
Don't really have them	1145876-1145858-123707438
I prefer to stay near the gate of my boarding place	1145876-1145858-123711038
Don't find it necessary	1145876-1145858-123712024
Unless I have a long layover, the time is better spent I feel, getting a snack, drink or just window shopping.	1145876-1145858-123712139
No time	1145876-1145858-123712259

Appendix 5

Participants' Reasons for Visiting Greenspaces at Airports

9.b Could you please describe why you choose to visit greenspaces at airports?

Showing all 22 responses Show less	
To stay away from the crowd, and to engage more with nature.	1145876-1145858-123693447
rest	1145876-1145858-123694064
Rest and grounding	1145876-1145858-123694267
Peaceful	1145876-1145858-123694663
To decompress, destress and get away from the noise of the terminal.	1145876-1145858-123695698
Jest zwykle ciszej niż w zatłoczonych korytarzach, większa przestrzeń, bycie na powietrzu, drzewa	1145876-1145858-123697305
Breafing space, relax	1145876-1145858-123698191
Usually to see the aircraft	1145876-1145858-123698138
Nice to get out! (Hopefully they are outside and not just a smoking area)	1145876-1145858-123698463
It's nicer and makes you forget about the crowds	1145876-1145858-123700146
fresh air (try to keep away from smokers!)	1145876-1145858-123701018
Smoking areas usually are with in these areas	1145876-1145858-123703293
Quiet space, feels calming, looks pretty	1145876-1145858-123703471
They usually have a good outdoor view and a terrace	1145876-1145858-123703649
With kids parks to keep them amused	1145876-1145858-123703820
It's relaxing.	1145876-1145858-123703856
Means relax for me .	1145876-1145858-123704432
Its green. Its looking better	1145876-1145858-123706152
Avoid claustrophobic feeling	1145876-1145858-123706536
Fresh air mainly and it's typically somewhere relaxing	1145876-1145858-123706647
airports Chopina Polonia	1145876-1145858-123706824
To have some fresh air or if it's an indoor space to have some natural light.	1145876-1145858-123713641