

Waiting Areas of Airports as Restorative Environments for Travelers

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Abstract

The main goal of the present study is to investigate if physical attributes in waiting areas of airports can influence their perceived restorativeness for travelers. This study employed a pre-survey to select the physical attributes that may have an impact on perceived restorativeness of airports and then applied an experiment as research method to obtain quantitative data. The present study used 203 students of the Norwegian University of Science and Technology as participants. Participants were required to rate the stimulus material of waiting areas in airports with different physical characteristics in the questionnaire. By comparing participants' mean scores, this study compares perceived restorativeness of waiting areas in airports with different physical settings and get results about the influence of different physical attributes.

The results suggest that there are four physical attributes (windows, crowding, seats and plant settings) having an impact on tourists' perceived restorativeness in waiting areas of airports. Perceived restorativeness of the waiting area in airports can be increased when the waiting areas in airports have windows, when they have abundant seating, when they have less people in them and when they have plants.

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1. Introduction

In this chapter, the necessity of researching a common urban environment, airports, as a restorative environment for travelers is presented.

1.1 Why Research on Restorative Environment?

In modern society many people are suffering from mental fatigue caused by daily stress and strains. Stress is defined as a process of responding to an imbalance between demands and available resources for meeting those demands (Stokols, 1972). Constant mental fatigue will affect individual's working performance and engender negative emotions (Hartig et al., 1997). There are many mental-fatigue-related illnesses, such as burnout syndrome, depression and anxiety (Kjellgren & Buhrkall, 2010). An assessment by the World Health Organization (WHO) indicates that mental disorders are growing worldwide: "Neuropsychiatric conditions accounting for approximately 13% of all Disability-Adjusted Life Years (DALYs), and accounting for 45% of the total number of years lived with disability (YLD) in those between the ages of 10 and 24 years" (WHO, 2004, pp.39-42).

Under these conditions, the relationship between environment and public health is receiving more attention. People's self-reported health status and quality of life are closely connected with their surroundings (de Vries, et al., 2003,). Individuals can have both physical benefits and psychological benefits from a comfortable environment.

Whereas individuals who chronically stay in a bad environment may have a higher probability to acquire diseases.

Research has shown that restorative experiences contribute to reduce stress and prevent mental-fatigue-related illness. Restoration is defined as “the process of renewing physical, psychological and social capabilities diminished in ongoing efforts to meet adaptive demands” (Hartig, 2004, pp. 2). Having restoration, such as connecting with natural environments, not only enhances an individual’s cognitive ability but also improves an individual’s physical condition. For example, restoration can help individuals decrease the frequency and tension of headaches, or reduce blood pressure (Levine, 2006). Since such experiences are more readily available in restorative environments, to design and build restorative environments is increasingly important. Before design and implementation of a restorative environment is conducted, an elucidation of an restorative environment is required.

1.2 Why Research on The Waiting Areas of An Airport?

Public transportation is crucial in everyone’s daily life for offering convenient traveling services, and air transportation is an important part of it. Airlines provide a fast and comfortable way for long distance traveling. Airports, as an essential part of airline services, should have been attached importance as well.

Existing research has shown that natural environments are more restorative than urban environments (Ulrich et al., 1991; Berto, 2005). However, with urbanization (nearly half of the world's population living in urban areas in 2008), people are having

less chances to connect with the nature (UNFPA, 2007). The importance of having restoration from common urban settings require attention. Still, some urban leisure settings can be restorative, such as museums or monasteries (Ouellette, Kaplan & Kaplan, 2005). Leisure places have higher potential on restorativeness because they are built for individuals to restore their attention capacity; while commercial places are more difficult for individuals to get restoration as they have to pay more concern to profits.

Airports are one of the common commercial urban settings. The functions of an airport is to ensure the safety and accuracy of flights, to guarantee the passenger's safety and comfort, to supply, examine, and repair airplanes, to guide passenger transfers into the city as convenient as possible, and to offer administrative service, such as customs inspections (Kazda & Caves, 2007). Since the priority of an airport is to provide good and safe transportation service, the majority airport space are functional, such as runways, check-in desks, and security check entries. Under these conditions, it can be assumed that restoration is mostly gained in waiting areas where passengers have a long stay but often without anything to do. Therefore, how to use physical settings in waiting areas to make airports restorative becomes an interesting and essential subject.

1.3 Why Research on Travelers?

Existing research has shown that tourism is one of the most popular ways for people to escape from the daily stress (Iso-Ahola, 1980). People who had gone through hard

work or study are willing to choose traveling to release their stress and achieve restoration. Since restoration is one of the major reasons that people have for tourism, it can be assumed that travelers will pay some attention to restorative environments. Besides, people who fly business trips usually keep working in airports, and they are less interested in getting restoration from surroundings. Therefore, holiday travelers became the target group of this research.

Normally, there are two types of travelers in the waiting area of an airport. One type is waiting for the departure and another is waiting for a flight transfer. The travelers waiting for the departure have just gone through hard work or study and prepare to obtain restoration by enjoying their vacation, while the travelers waiting for a flight transfer may have suffered from fatigue from a tiring long flight or former traveling. They are all in need of restoration. They would all benefit from restorative settings in waiting areas of airports.

2. Theoretical Background

This chapter introduces the conceptual framework of the present study in 2.1, 2.2 and 2.3, summarizes related literature which studies environmental restorativeness in 2.4, and describes the scale used in the questionnaire of the present study in 2.5.

2.1 Attention Restoration Theory

The attention restoration theory starts from James's distinction (1892) between two forms of attention, directed attention and fascination.

Individuals complete daily tasks upon direct attention. Direct attention has three functions; orienting, alerting and central executive. Orienting means perceiving changes in the surroundings; alerting means keep conscious and vigilant on tasks; central executive means coordination between memory and reaction (Raanaas et al., 2011). To provide direct attention, individuals have to achieve focus, delay expression of inappropriate emotion or action, and inhibit intrusive distractions. All these processes use up an individual's mental resources and cause mental fatigue (Kaplan & Kaplan, 1989). People can recover their direct attention through sleep, however, "the magnitude of direct attention fatigue exceeds what sleep can correct" (Kaplan, et al., 1993, pp.727).

Fascination, on the other hand, is completely different from direct attention. It is involuntary or effortless attention, and it offers restorative experience which can help individuals restore the ability of direct attention (Hartig et al., 1991; Hartig, 2004).

Furthermore, the differences between these two kinds of attention include the evoking stimuli. Direct attention is risen by personal inside intention and purpose, driven by people's volition; while the fascination is stimulated by outside environmental patterns (Kaplan, 1995; Berto, Baroni, Zainaghi & Bettella, 2010). Hence, it can be assumed that whether a person can get a restorative experience or not is highly connected to the environment.

In Attention Restoration Theory, the progress of restoration has four levels when individuals devote sufficient time into a restorative environment. At the first level, individuals can clear up their mind and let random thoughts wander. At the second level, direct attention is been charged. At the third level, soft fascination can induce random thoughts and enhance the individual's cognitive ability. At the fourth level, the individual's inside priorities are evoked and their goals and possibilities are reflected. (Han, 2003).

People can access restorative experiences at various times and places. Restorative environments have a wide range from wilderness (such as mountains, lakes, etc) to indoor environments (such as cafeterias, greenhouses, etc) (Kaplan et al., 1993). In recent years, studies have found that natural environments are perceived to be more restorative than urban environments (Ulrich et al., 1991; Berto, 2005), and that simulated natural environment were more restorative than simulated urban environments (Hartig et al., 1996; Laumann, Gärling, & Stormark, 2003). Measuring the restorativeness of specific environments, it is difficult to evaluate and compare overall restorativeness of one environment with another. Therefore, theoretical and

empirical research about restorativeness is more concerned with certain characteristics during the interaction between individuals and environments (Kaplan & Kaplan, 1989; Hartig, Kaiser & Bowler, 1997). There are four interrelated characteristics of restorative experiences: *fascination*, *a sense of being away*, *extent* and *compatibility* (Kaplan et al., 1998). A restorative place needs high quality of fascination for individuals to replace direct attention, needs to give individuals a sense of being far away from daily life, needs to have large and rich content for individuals to explore and needs to match an individual's personal purpose and requirements (Berto, Baroni, Zainaghi & Bettella, 2010).

Fascination means effortless attention and it includes processes and content which can be oriented to specific events (for example, watching movies or gambling, etc) or specific contents (for example, water and mountains, etc). It plays a vital role in the Attention Restoration Theory. Restoration happens when individuals are in a situation in which fascination replaces direct attention. Fascination's stimuli are not simply random objects but elements that can connect to a large framework with movement and color (Berto, Baroni, Zainaghi & Bettella, 2010). All these things can be especially found in natural environments (Levine, 2006). There are two kinds of fascination. One is *soft fascination*, and the other is *hard fascination*. *Soft fascination* has "a moderate intensity and is allowed by aesthetically pleasant stimuli which do not preclude the possibility for reflection"; while *hard fascination* means "a very intense involvement, leaving little room for thinking, and thus supporting restoration to a lesser extent" (Scopelliti & Guliani, 2004, pp.424). Soft fascination is easily found in natural settings,

such as a beautiful waterfall in the mountains or a colorful sunset; while the example of hard fascination can be a competitive sporting event (Felsten, 2009). Hard fascination occupy an individual's attention and generally leaves no place for individuals to reflect other things (Felsten, 2009). Such fascination cannot benefit individuals to reach deep restorative experience (Herzog et al., 2003), while settings said to have soft fascination, like natural settings, may give individuals more restorative experience.

A sense of being away consists of three aspects: being away from unwanted distractions from environment, being away from one's daily work assignments and being away from specific events. It includes the psychological sense of being away (such as imaginary) and the geographical distancing (such as traveling) (Hartig, Kaiser & Bowler, 1997). Clearly, the psychological sense of being away is more helpful than a physical transformation (Kaplan, 1995).

Extent means the connectedness and scope of an environment. When people perceive an environment, they will firstly regard it as a whole instead of perceive every single element in it. An environment with good quality of extent always gives people richer content to explore rather than the immediately perceived whole. Besides, sufficient contents in the environments will help individuals restore their attention capacity by evoking fascination to replace direct attention (Kaplan, 1995).

Compatibility means the consistence of the specific environment with an individual's purposes and how these purposes have been encouraged, supported by this environment. The compatibility of one environment is complicated because different people are

holding different purposes and the range of purposes are wide from conceptual ideas, such as to be in a bright environment, to specific ideas, such as to be in a garden (Herzog et al., 2003). Compatibility also includes legibility, which refers to whether the environment is easy enough for individuals to precede further or not (Hartig, Kaiser & Bowler, 1997).

2.2 Physical Attributes Influencing Perceived Restoration

Since our surrounding environments are full of physical settings, the physical settings (for example: water, mountain, walls and plants) have an important influence on an individuals' well being. Characteristics of the environment, such as structure, depth and complexity, can also have an influence on an individual's performance. These connections began in ancient times when people had to adapt to natural settings and they have an impact in present days through evolution (Ulrich, 1993). When ancient humans first managed to survive in the wildness they were searching for places which were rich of food, water and shelter. Being capable of doing that means that "humans must be able to read the possibilities and obstacles of the natural environment" (Grahn & Stigsdotter, 2003, pp.4). Therefore, environments with water, food and shelter became a safe signal, and humans will feel relief and security in such surroundings (Ulrich, 1993). Because of the evolution, such landscapes with safe signals all carry a potential to reduce individuals' stress and help them recover from fatigue.

The study of landscape has a long tradition, which can be traced back to 1960s. In

1989, the Kaplans developed a framework identifying which physical factors are playing key roles affecting people's preference of landscapes (Kaplan & Kaplan, 1989). Landscapes which have restorative characteristics will help people reduce the level of stress, ease anxiety and elicit positive emotions (Kjellgren & Buhrkall, 2010). Beneficial physical settings facilitate restoration from stress and mental fatigue. When people are exposed to a restorative environment, feelings of pleasure and calmness will be evoked and people's attention will be easily held and replaced by positive thoughts (Ulrich, 1996; Hartig et al, 1996). At the same time, some physical attributes, such as noise or bad lighting, are known to have a negative influence on individuals' cognitive performance (Griffin & Boyce, 1971; Knez & Hygge, 2002; Raanaas et al., 2011).

A restorative environment has sustaining impacts on individuals, not only when individuals manage to seek restoration. There is a concept in Attention Restoration Theory framework, which is called "micro restorative experience". It represents a kind of restorative experience which is very short, such as glancing at plants, but still offers replacement of direct attention. In these short moments, when looking out the windows and seeing flowers blooming or birds singing, individuals can feel "be away" from reality and recover from mental fatigue (Kaplan, 1993). Such a "micro restorative experience" is evoked by physical surroundings and "such a brief opportunity to recover one's attentional capacity might be expected to enhance competence and cooperativeness" (Kaplan, 1993, pp.196). Therefore, when a specific environment contains physical characteristics which can evoke micro restorative experiences, individuals may experience restoration in that surroundings.

Nine aspects are suggested and examined by current researches to have restorative benefits in an environment: way-finding systems, lighting, noise levels, air flow, temperature, labeling of facilities, ease of stress, seating and comfort (Packer & Bond, 2010). And other physical elements, such as nature and crowding are also proven to be relevant for restoration (Evans, 1984; Raanaas et al, 2011). In my thesis, windows, seats, plants and crowding are investigated as main attributes on perceived restorativeness due to the specialty of airports as a restorative environment. Also, other physical attributes, such as way-find systems, lighting, noise levels and labeling of facilities, are very difficult to manipulate. In order to investigate the influence of these factors, participants have to be in the actual airports' waiting areas and all these waiting areas should be manipulated to show different physical attributes. Therefore, this methodology is too difficult for the present study for it will cost too much efforts.

Windows

Windows provide ventilation, weather information, visual connection to the outside, sunlight and a psychological escape route in the building (Aries et al., 2010). The result of Lether, Pyrgas, Beale and Lawrence's research in 1998 found windows on natural scenery have a significant influence on reducing job stress. Kaplan (1993) found that indoor office workers with windows on natural scenery reported less diseases and headaches than those without windows or without windows facing nature. There were also some researches indicating that more complaints and health problems as reported

when a person is located far away from windows (Veitch, et al. 2005; Yildirim, et al., 2007). The research of Küller & Lindsten in 1992 showed that windows were having a positive impact on reducing children's stress and enhancing their well-being in classrooms. However, windows are found to have negative influences as well, such as "glare and thermal discomfort" (Aries, et al., 2010, pp.534).

The view that a window is presenting is also very important for individuals to get restoration. Individuals tend to prefer natural views over urban views because windows for natural scenes always provide better restoration than urban scenes (Hartig, et al., 2003; Ulrich, 1984; Kaplan, 1995).

Seating

Seats offer individuals a place to avoid disturbance and get rest. The seating arrangement is an essential element of the physical setting in public places. Some studies show that the seating arrangement influences people's performance in group discussions (Steinzor, 1950; Hare & Bales, 1963). Seating arrangements also have an impact on students' behavior. Students are more likely to ask questions in a semicircular seating arrangement than in a row-and-column seating arrangement (Marx, 2000).

Moreover, the materials of seats can also affect people's attention. Some offices insist using hard seating because it may help staff focus on their assignment during work time (Davis, 1985). On the other hand, soft seating may help people relax and get restoration.

Crowding

Crowding is highly connected to privacy regulation. Individuals regulate their private space by social interaction and physical adjustment (Altman, 1975). Crowding happens when the regulation of social interaction fails and the amount of social interaction exceeds an individual's desire. The density of a specific environment, which is defined by the number of people per unit of space, is highly connected to the perceived crowding (Evans & Wener, 2007).

Crowding is closely associated with mental health. Research of Lepore et al. in 1991 proved that adults would have a worse mental status in homes with high density. And different mental statuses have also been measured among children living in homes with different density (Evans et al., 2002). In a crowded environment, people will easily experience stress (Evans, 1984). People become more violent and lose control in crowded environments (Thomas, et al., 1998). They will led more threat and compete driven by the desire to expand and guard their own territory (Stokols, 1972).

On the contrary, less crowded environments are assumed to make people relax and help people release stress. Therefore, non crowded environments may help people to have restoration.

Natural setting

Nowadays, people want to contact to natural settings during urban life (van den Berg, 2007). Natural settings provide "soft fascination" and promote restorative experience (Roe & Aspinall, 2011). Landscaped natural environments (such as gardens and parks) have been shown to fulfill people's restorative needs (Levine, 2006). In outdoor landscape, such as small city parks, the percentage of grass cover and the amount of bushes and trees are found to be the most important physical attributes contributing to the restorativeness (Nordh, et al., 2009).

Also indoor plants have been shown to improve individuals' cognitive performance. Both office workers and students prefer working environments with indoor living plants or windows with view of green plants (Raanaas et al, 2011). Besides, there were also studies investigating that people who are living with nature nearby are less violent and aggressive than people living near barren buildings (violent behavior has been shown to connect to mental fatigue) (Kuo & Sullivan, 2001). Therefore, plants settings can be considered a physical attribute influencing perceived restorativeness.

2.3 The Influence of Gender and Traveling on Perceived Restorativeness

Gender differences in perceived restorativeness were discovered by some existing studies. Hartig et al.'s study in 1998 indicated that women and men have different needs and experiences of restoration towards home as a restorative environment. However,

there were also some studies reporting no significant influence of gender on perceived restorativeness. Bodin et al' s study (2003) found no clear results trying to show that men and women have different restorative benefit locating from indoors to outdoor.

Traveling is also considered to be closely related to restorative environments. Traveling includes five stages: anticipation (planning trip), travel to the site, on-site behavior, return travel and recollection (reflection on the trip) (Clawson & Knetsch, 1966). During the anticipation stage, different people choose different traveling destinations driven by their own desire of restoration (Pearce, 1982). During the other stages, the benefits and enjoyment of individuals are also highly connected to the perceived restorativeness of traveling environment. Travelers will feel relief in a restorative landscape.

According to previous studies, possible travelers prefer ground transportation during traveling. They regard the airplanes and airports as stressful environments and think it is hard to have enjoyment in airports during vacation (Fridgen, 1984). Sommer (1974) said that airports are "socially destructive buildings" which are constructed to "inhibit social interaction". With the development of airlines, the design and facilities of airports are becoming more user-friendly. And the studies on airports' restorativeness will help to pursue more restorative design of airports.

2.4 The Perceived Restorativeness Scale (PRS)

In order to test the restorativeness of physical environments, valid measurements are

required. Many studies have put efforts on developing a good measurement of restorativeness. The important characteristic of a good measurement is that the measurement should be able to discriminate different environments (Laumann et al., 2001). Among all these studies, two measurements have been widely used. One is the Perceived Restorativeness Scale (PRS), which was developed by Kaplan et al. (1989) and revised by Hartig, Kaiser and Bowler (1997); the other is the Restorative Components Scale, which was developed by Laumann et al. (2001). The theoretical background of these measurements is the Attention Restoration Theory. Their validity and reliability has been examined by previous studies (Hartig, Korpela et al., 1996). The differences between these two measurements are the measuring components. The PRS measures four components (fascination, being away, extent, compatibility), while the RCS measures five components (fascination, novelty, escape, extent, compatibility) (Herzog, et al., 2003).

The original PRS had 44 items, which were all presented in the form of short sentences. However, some sentences in the original PRS were more like phrases, which were not normally used in people's daily life. Therefore, when applied the PRS among ordinary people who are unfamiliar with the Attention Restoration Theory, the validity of the PRS could be affected (Han, 2003). In 1997, The initial PRS was further developed by Hartig, Kaiser and Bowler. The revised PRS ascertained the connections between the questionnaire and the four-factor model of the Attention Restoration Theory involving factors of *Being away*, *Fascination*, *Coherence (Extent)* and *Compatibility*. And they edited questionnaire items to make them more appropriate

under the theoretical model and more sensible in daily life (Hartig, Kaiser & Bowler, 1997).

3. Purpose and Hypothesis

The main goal of the present study is to apply the Attention Restoration Theory on urban commercial environments' restorativeness.

Through comparing perceived restorativeness of stimuli material of waiting areas in airports, the purpose of the present study is to test if physical attributes in waiting areas of airports can influence perceived restorativeness for travelers. All stimuli material was manipulated systematically to present four different physical settings in airports' waiting area. This research applied questionnaires to obtain quantitative data of perceived restorativeness of each stimuli material of waiting areas in airports for travelers.

Based on the theoretical background, I developed my theoretical assumptions for this study. I assumed that physical characteristics (window, seating, crowding and plants) would affect perceived restorativeness of waiting areas in airports for travelers. The perceived restorativeness would be improved when there are windows, when there are abundant seatings, when there are less crowding and when there are plants in waiting areas of airports.

My hypothesis is that there are significant differences in perceived restorativeness when one of these four physical attributes (window, seating, crowding, and plants setting) changes. The scores of travelers' perceived restorativeness will be significant higher when the waiting areas in airports have windows, when they have abundant seats,

when they have less crowd and when they have plant settings.

Besides, this research also investigated the influence of personal factors (gender, preference on airplane traveling and frequency of using airlines) on perceived restorativeness of airports' waiting area for travelers. I assumed these three variables would have an impact on perceived restorativeness of waiting areas of airports. My hypothesis is that significant differences on perceived restorativeness score will exist between different gender groups, the group who like traveling by airplane and the group who don't like traveling by airplane, and also different groups with different frequency of using airlines.

4. Methodology

This chapter describes the whole process and results of the pre-survey in 4.1, and introduces the quantitative methodology (questionnaire survey) used in the present study in 4.2.

4.1 Pre-survey

In order to investigate how people evaluate an airport as a good or a bad facility, this research started with a pre-survey. This pre-survey included a short questionnaire with two questions: *“Which airport do you think is the best airport and why?”* and *“Which airport do you think is the worst airport and why?”*

Participants were randomly chosen and asked at Norwegian University of Science and Technology (NTNU) campus and several international airports. Also this short questionnaire has been posted online for participants to reply.

This pre-survey got 51 responses in total in a month. The Schiphol Airport in Amsterdam, Netherland was voted to be the best airport (37/52)(There were 52 airports mentioned as best airports because one participant chose two airports when answering the questionnaire) and another seven airports (Copenhagen Airport, Trondheim Værnes Airport, Oslo Gardermoen Airport, Helsinki International Airport, London Heathrow Airport, Brussels Airport, Flughafen München) in Europe, three airports (Chengdu Shuangliu International Airport, Singapore International Airport, Hong Kong

International Airport) in Asia were also mentioned.

The Tegel Airport in Berlin, Germany was chosen to be the worst airport (11/51); other mentioned worst airports included John Kennedy International Airport, Brussels Airport, Girona Airport in Barcelona, Oslo Rygge Airport, Paris Charles-de-Gaulle Airport, Palermo Punta Raisi Airport, Faro Airport, Milan Linate Airport, Beijing International Airport, Eleftherios Venizelos International Airport, Copenhagen Airport, Oslo Gardermoen Airport, Roma Fiumicino Airport, and London Heathrow Airport.

The reason why participants always chose airports in Europe is mainly because this pre-survey was conducted at NTNU (a university in Europe in which most students are from European Countries) and some international airports in Europe, such as Amsterdam Schiphol Airports, Paris Charles-de-Gaulle Airport and Oslo Gardermoen Airport. However, since the goal of this pre-survey is to investigate the criterion people use to evaluate an airport, the limitations of the sample can be ignored.

The criteria participants used to determine the best airport and the worst airport are multifarious. Some criteria are about the service in airport, and some are about the airport's physical settings (see Table 4.1). The most frequent reason mentioned is the influence of plants. Rich plant settings make participants feel comfortable. Other reasons mentioned less frequently but still important are the building and decoration design of the airports, whether the airport is crowded or not, whether the staff and service of the airports are considerate or not, and if the airport has enough seats and windows.

The amount and quality of entertainment areas and shopping areas were also chosen

as a criterion for scoring an airport. However, towards this criterion, participants were holding different opinions. Some regarded entertainment areas and shopping areas in airports as positive influence for offering leisure; while others might experience a quiet waiting area without noisy leisure facilities and shops as more relaxing.

Besides, the way-finding system, enough acreage with average density, the cleanness, and the safety controls were also been mentioned as criteria used by participants to evaluate an airport. Considering that the present study aims to research the influence of physical settings on airport's restorativeness, I decided to use windows, seating, crowding and plant settings as independent variables to investigate how they influence airports' restorativeness perceived by travelers.

4.2 Quantitative Research Methodology

4.2.1 Participants:

Some former studies have found that college students generally represent the common population in research areas such as “environmental perception and landscape assessment” (Daniel & Boster, 1976; Anderson & Schroeder, 1983; Han, 2003). Therefore, this study employed students of Norwegian University of Science and Technology as participants.

Table 4.1 The named criteria that participants use to determine the best airport and the worst airport

Named Criteria	worst airport	
	Times be mentioned as positive criteria	Times be mentioned as negative criteria
Plants	24	6
Building and decoration design	20	7
Crowding	2	16
Staffs and service	5	12
Seats	6	10
Entertainment and shopping area	9	3
Windows	9	2
Way-finding system	2	8
Acreage	6	4
Cleanness	2	5
Others(safety control, strike)	0	2

The participants were invited by E-mail and social website information. I posted an invitation of the questionnaire survey and a short question “Do you like traveling?” on my personal page of several social websites. I also sent E-mails to my friends who are studying in Norwegian University of Science and Technology with the same invitation and question. And my friend helped me forward these e-mails to their friends who are studying in Norwegian University of Science and Technology. All the people who got

the invitation and had interests in this questionnaire survey needed to answer the question first. Only the people who answer “Yes” were request to be the participants of the present research. Based on the response from E-mail contact and social website, 210 participants confirmed to attend the questionnaire survey. Then information about location, time and procedure of the questionnaire survey was sent to every participant. Finally, 203 participants appeared and completed valid questionnaire.

The average age of participants was 22.69 years (range from 18 to 34) (see Fig 4.1). And the gender distribution in this research was 28.02% male and 71.92% female (see Fig 4.2).

The participants were randomly divided into four groups. Group 1 had 51 participants, and Group 2 had 52 participants, and Group 3 had 50 participants, and Group 4 had 50 participants. The average age of each group is shown in Fig 4.1. And the gender distribution of each group is shown in Fig 4.2. Every group watched the same stimulus materials but with different presenting orders and filled out the same questionnaire.

Fig 4.1 The mean age of each group and all participants

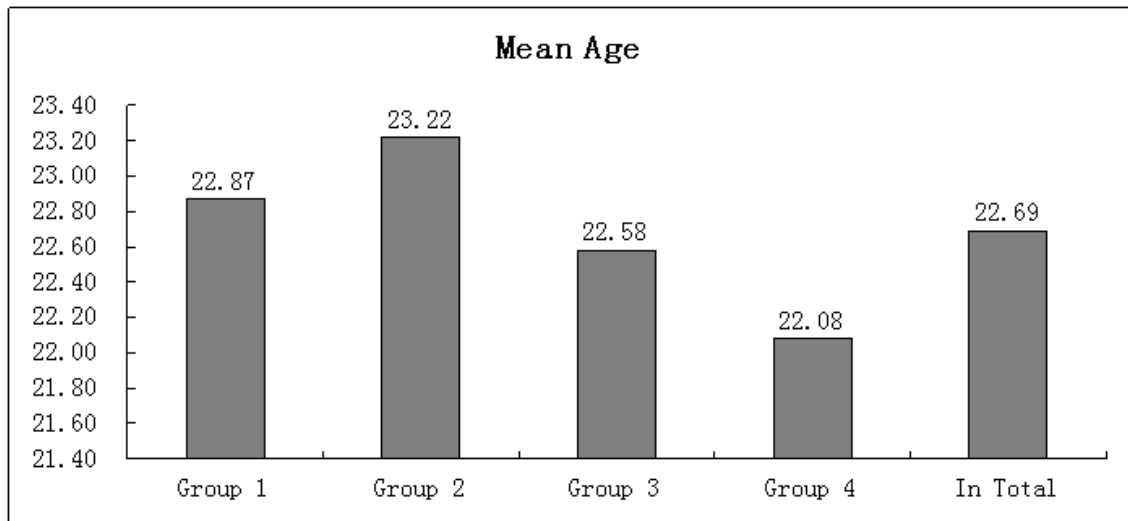
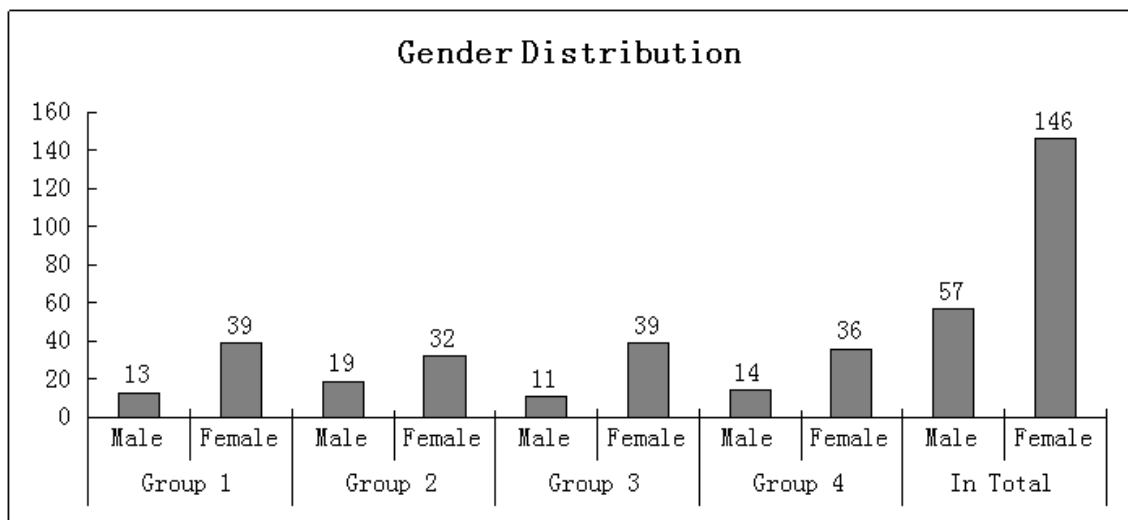


Fig 4.2 The gender distribution of each group and all participants



4.2.2 Stimulus Material

Simulated natural materials, such as photos or videos of nature, can be used as substitute for actual natural environment in experiments (Kjellgren & Buhrkall, 2010).

Berto (2005) tested the restorative effects of nature photos among college students by comparing the attention capacity between a group that watched the nature photos and a group that watched non-nature photos. The result showed that the improvement of attention capacity was only achieved in the group that watched photos of natural scenes (Berto, 2005). Besides, there was other studies suggesting that “direct exposure to nature and viewing simulated nature can be equally restorative” (Felsten, 2009, pp.161). Therefore, using simulated environmental material as substitute for actual environment can be and has been widely used in environmental psychological researches, such as the research on the effect of high and low fascination environments on attention fatigue (Berto et al., 2010).

Based on those studies, the present study employed photos of different airports’ waiting areas as stimulus material to investigate airports’ perceived restorativeness for travelers. The benefit of this methodology is to avoid biases caused by other unrelated environmental variables. Comparing to investigating passengers in actual waiting areas of airports, this methodology can make participants focus on the effect of physical settings in airports’ waiting areas. Besides, it can diminish the influence of sudden incidents, such as frustration caused by flight delay or uncomfortable feelings caused by bad weather. On the other hand, the weakness of this methodology is that participants are not in the real waiting areas of airports. So, there may be biases caused by personal factors, such as the differences between different participants’ imagination based on same stimulus material. Different people have different past experience that may led to different capacity of imagination. However, since it would have been very

difficult for this study to allow participants experience airports' waiting areas with different physical settings and without other disturbing factors, the chosen methodology seemed to be the most suitable one.

In the present study, the purpose was to research on the influence of four physical attributes (windows, seats, crowding and plants) on restorativeness of airports' waiting area of travelers. Each attribute has been investigated on two levels (see Table 4.2). Therefore, the simulated materials employed four categories of photos of airports' waiting areas which focus on four different physical settings.

Table 4.2 Levels of Physical Attributes

Physical Attributes	Windows	Seats	Plants	Crowding
Levels	Many windows	Many seats	Many plants	Many people
	No windows	No seats	No plants	No People

The photos were collected from the internet or were taken by the author in some international airports. These photos were all shot at eye level because they can show the physical settings clearly and thoroughly and also this angle provides the most realistic impression. A reduction process was applied to remove low quality photos. Then, 20 photos remained for their good quality and legible view of specific physical settings. Based on these 20 photos, each photo was modified by a picture manipulatory software (Photo-shop). In total, 40 photos were obtained as the integrated simulated material.

These 40 photos are classified into four categories (focus on windows, focus on

crowding, focus on seats and focus on plants). Each category has two parts and each part shows different levels of specific physical attributes. Every category includes 10 photos and each part consisted of 5 photos. Figure 8.1-8.4 in the appendix provide examples. Fig 8.1 shows an example of stimulus material which focus on windows. The photo on the top of Fig 8.1 shows an airports' waiting area with many bright and large windows, through which people inside can see the outside. And the photo on the bottom of Fig 8.1 shows an airports' waiting area without any windows. Fig 8.2 shows an example of stimulus material focusing on crowding. The photo on the top of Fig 8.2 is a waiting area of airport without any people in it. The photo on the bottom of Fig 8.2 is a waiting area full of people. Fig 8.3 shows an example of stimulus material which focus on plants. The upper photo in Fig 8.3 is an airport's waiting area without any plants and the lower photo in Fig 8.3 shows an airport's waiting area with a large amount of plants. Fig 8.4 illustrates an example of stimulus material that focus on seats. The upper photo in Fig 8.4 shows an airport's waiting area with many available seats. The lower photo in Fig 8.4 is an airport's waiting area without enough seats and some people are standing due to the lack of seats. There might be sight similarities between the stimulus material focus on crowding and the stimulus material focus on seatings. However, when presenting them, the author supplied some instruction words to lead participants having more focus on what the stimulus material wants to present. For example, when presenting the stimulus material focus on crowding, the author read instruction words like "Please image you are in a waiting area of airports full of people/ without people"; while when presenting the stimulus material focus on seats, the author read instruction

words like "Please image you are in a waiting area of airports having enough seats and every passengers are waiting on their own seats/ having limited seats and some passengers are standing because they can not find any seats."

All four categories of photos together make the completed stimulus material.

4.2.3 The questionnaire

This study chose to apply the Perceived Restorativeness Scale (PRS) as the measurement because it is more widely used in the research area of restorativeness of environments and it is suitable for the framework (four factor framework of the Attention Restoration Theory) of the present study.

The scale employed by this study is based on scales used in two previous studies. One is Hartig et al. (1997), the revised PRS, and the other is Packer and Bond (2010). The whole questionnaire needs 30 minutes to be accomplished. It includes three parts. The first part includes questions about the personal information of participants: the gender, the age, the nationality, the profession, the preference on traveling, the preference on traveling by airlines and the frequency of using airlines.

The second part is a 7-point-scale (0= not at all, 1 = very little, 2 = rather little, 3 = neither little nor much, 4 = rather much, 5 = very much, 6= completely) questionnaire which measuring perceived restorativeness in a specific environment. It consists of 26 items (the same items with the revised PRS by Hartig et al. In 1997) and measures four factors of perceived restorativeness by four subscales. The subscale measuring "being

away” includes five items (for example: ”Being here is an escape experience”). They are item 1 to item 5 in the Perceived Restorativeness Scale in Appendix 8.2. The subscale measuring fascination includes eight items (for example:” I want to spend more time looking at the surroundings”). They are item 6 to item 13 in the Perceived Restorativeness Scale in Appendix 8.2. The subscale measuring coherence (extent) includes four items (for example:” There is a great deal of distraction”). They are item 14 to item 17 in the Perceived Restorativeness Scale in Appendix 8.2. The subscale measuring compatibility includes ten items (for example:” I could easily form a mental map of this place”). They are item 18 to item 26 in the Perceived Restorativeness Scale in Appendix 8.2. Participants needed to score from 0-6 to express their agreement with every 26 items after seeing the stimulus material. And the present study calculated the mean score for each participant on every subscale and used the mean scores for analyzing the perceiver restorativeness (every participant's scores of the subscale *coherence* has been rotated for once, that is rotate the scores from 0 to 6/ 1 to 5/ 2 to 4, to be consistent with other subscales' scores). Furthermore, a total score of perceived restorativeness was calculated as the mean score of all 26 items.

The third part of the questionnaire is an open question. It encourages participants to write if there any other physical factors they think can be influential on restorativeness.

4.2.4 Procedure

The questionnaire survey was conducted in a classroom which was about 15 m² and

without windows. The equipment in the classroom were several tables, chairs, a computer and a projector connected to the computer.

Before the official experiment, an instruction was presented on the projector screen which announced the safety of participants' private information and their right to withdraw whenever they want.

Then the official experiment began. At first, the participants needed to answer questions about their age, their gender, if they like travel by airplane and their frequency of using airlines.

Next, they were asked to imagine that they were on a holiday trip and in the waiting area of the airports shown on the photos. The use of subjects' imagination to familiar environment has been applied in many researches, especially in research about restorative environments (Nordh et al., 2011). The instruction was "Image that it is a holiday and you plan to fly out for traveling. Now you are staying at a waiting area of an airport."

Then participants were asked to turn to the second page of the questionnaire. On that page, there was the scale used to measure perceived restorativeness. The left side of the scale were 26 sentences, and the right side was 8 columns of blank forms. Participants were required to score the degree of agreement with 26 sentences in the columns of blank forms on the right side after seeing stimulus material. Each column of blank form has a number marked on the top. Afterwards, five photos in one part of one category of stimulus material were shown on the projector. Participants need to rate the score about

their perceived restorativeness in the column of blank form numbered 1 after seeing these photos. After that, all five photos in the other part of the same category of stimulus material were shown. And participants needed to fill in the No.2 column of blank form of the questionnaire. The reason why participants rated a group of five photos was because a group of photos can give participants more material to image the waiting area they are in than a single photo. Whereafter, one part of another category of stimulus material was presented on the projector and participants need to fill the No.3 column of blank form after watching them. And then the other part of the same category of stimulus material was shown and participants filled the No.4 column of blank forms afterwards. The same procedure went on until all the stimulus material was presented and participants filled all eight columns of questionnaire.

All 203 participants were randomly divided into 4 groups. Each groups had the same procedure at the same place on one day at different times. The stimulus material presenting to each groups was slightly different. A control for ordering-effect was applied to avoid the influence of participants getting tired or bored on the last photos of stimulus material. The four categories of stimulus material were presented in different order to different group but the presenting order of two parts in any one category did not change. Every photo of the stimulus material was presented for 10 seconds.

At last, participants were asked to write any other physical attributes, which they think may have influence on perceived restorativeness in waiting areas of airports for travelers except these four investigated attributes.

5. Results

This chapter introduces the statistical analysis procedure of the present study in 5.1, and presents the statistical results in 5.2.

5.1 Analysis Procedure

Firstly, the result of the Perceived Restorativeness Questionnaire was analyzed by a series of dependent T-tests. It was applied to see if there were any significant differences between two groups of data measured in the same person when one independent variable changed. If there were significant differences between two groups of data, it meant the independent variable was influential on these data, which also meant corresponding physical attributes most likely impacted perceived restorativeness of waiting areas of airports for travelers. If there were no significant differences between them, it meant the independent variable was most likely not impacting the dependent variable, which also meant corresponding physical attributes had no influence on perceived restorativeness.

After the dependent T-test analysis, an ANOVA analysis was performed to figure out if there were any significant differences between gender, groups of people who like travel by airplane and who do not like it, and also groups of people who have different frequencies of using airlines. If there were significant differences in any of these three comparisons, the corresponding independent variable (gender, like traveling by airlines

or not and frequency of using airlines) had most likely an influence on perceived restorativeness.

Moreover, the open question at the end of the questionnaire was summarized as qualitative data to help explore new physical attributes which may be related to perceived restorativeness of waiting areas in airports for travelers.

5.2 Statistics Result

5.2.1 Results of Depend T-test Analysis

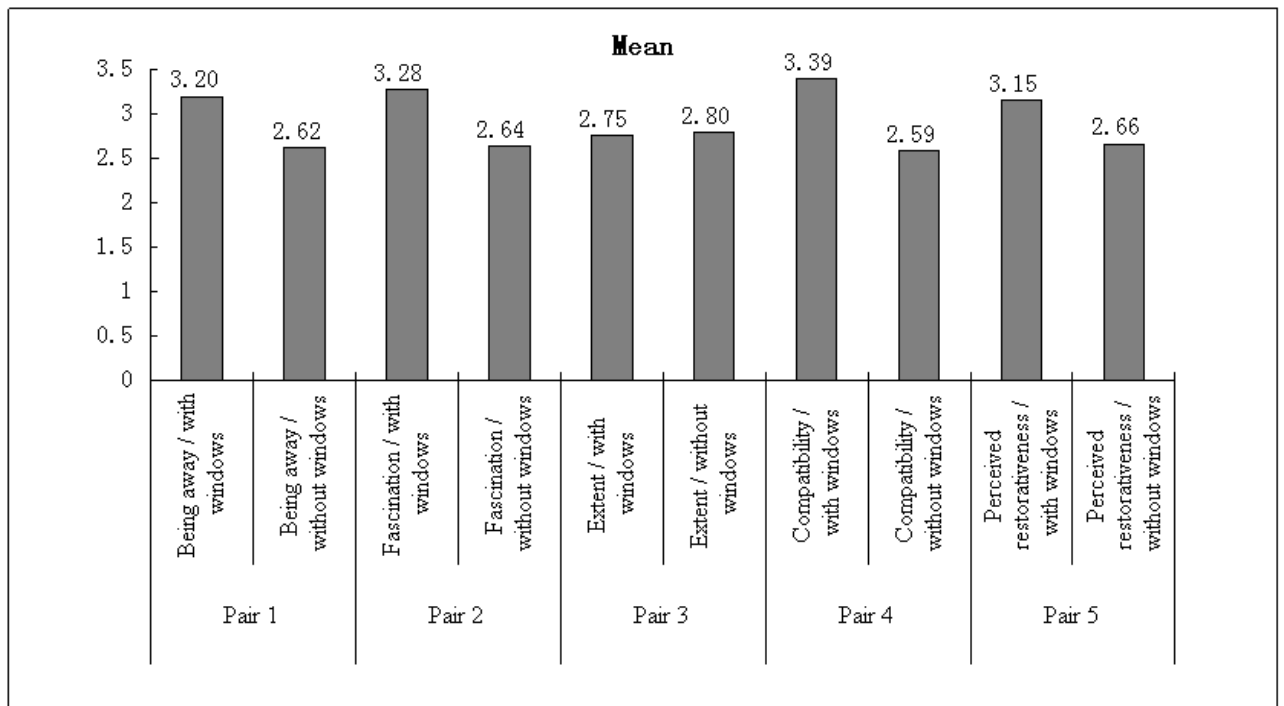
Participants were found to report significant differences in the total score of perceived restorativeness between watching pictures of airports' waiting areas with many windows and without windows. The results of the *Being away* subscale show a significant difference between scores of subjects after seeing pictures of airports' waiting areas with many windows and without windows. The results of the *Fascination* subscale illustrate a significant difference between scores of subjects after seeing pictures of airports' waiting areas with many windows and without windows. The results of the *Compatibility* subscale report a significant difference between scores of subjects after seeing pictures of airports' waiting areas with many windows and without windows. Therefore, significant differences are found on perceived restorativeness and its subscales of *Being away*, *Fascination* and *Compatibility*, and all scores of watching pictures of airports' waiting areas with windows are significantly higher than those of watching photos of airports' waiting areas with no windows. However, there are no

significant differences on the *Extent* subscale after seeing the two stimuli (see Table 5.1 and Fig 5.1).

Table 5.1 Statistic data of dependent T-test (Under the condition with/without windows)

	Mean	N	SD	T	df	p	SE
Pair 1 Being away(with windows)	3.20	203	1.05	5.27	202	<0.001	0.07
Being away(without windows)	2.62	203	1.14				0.08
Pair 2 Fascination(with windows)	3.28	203	.88	7.50	202	<0.001	0.06
Fascination(without windows)	2.64	203	.92				0.06
Pair 3 Extent (with windows)	2.75	203	1.24	-.39	202	.697	0.09
Extent (without windows)	2.80	203	1.13				0.08
Pair 4 Compatibility (with windows)	3.39	203	.96	8.66	202	<0.001	0.07
Compatibility (without windows)	2.59	203	1.00				0.07
Pair 5 Perceived restorativeness(with windows)	3.15	203	.77	7.17	202	<0.001	0.05
Perceived restorativeness(without windows)	2.66	203	.78				0.05

Fig 5.1 Mean Comparison within pair (Under the condition with/without windows)



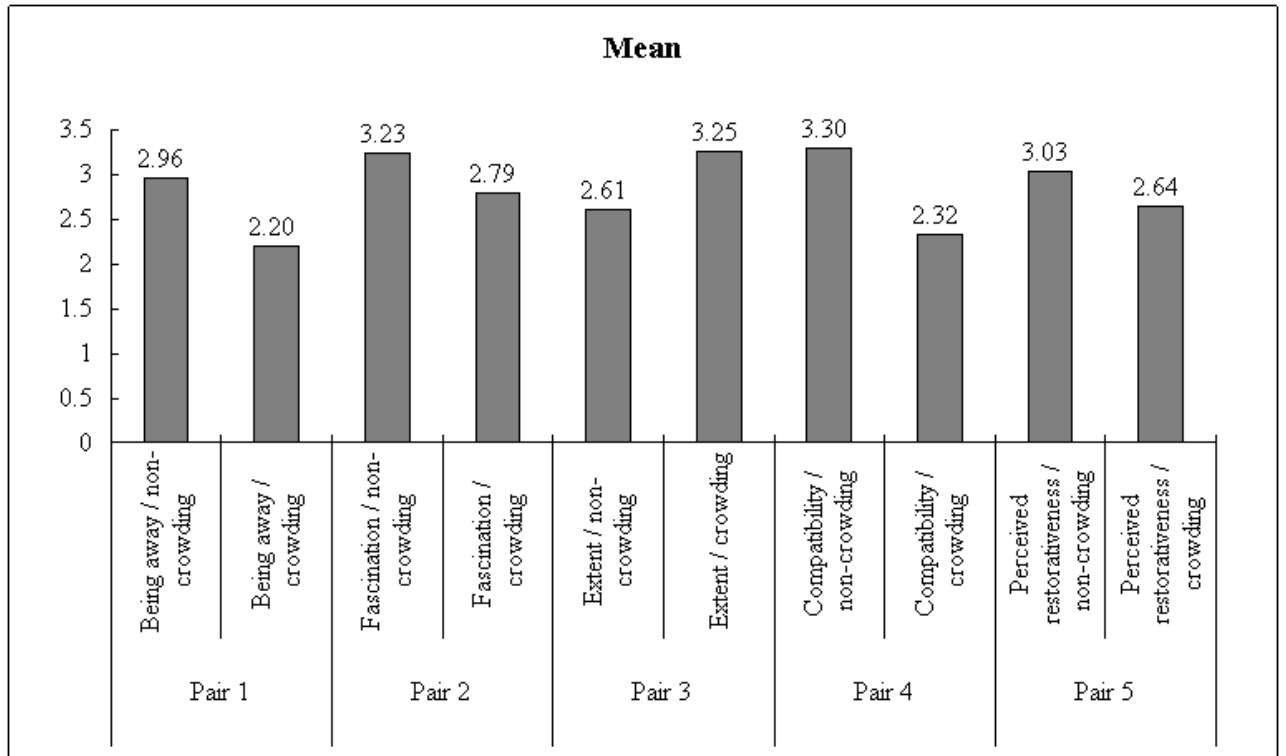
Participants were found to report significant differences on the perceived restorativeness score between watching pictures of airports' waiting areas with crowding and with no passengers in them. The results of the *Being away* subscale show a significant difference between scores of subjects after seeing pictures of airports' waiting areas with many people and without passengers. The results of the *Fascination* subscale illustrate a significant difference between scores of subjects after seeing pictures of airports' waiting areas with many passengers and without people. The results of the *Extent* subscale show a significant difference between scores of subjects after seeing pictures of airports' waiting areas with many passengers and without people. The results of the *Compatibility* subscale show a significant difference between scores of subjects after seeing pictures of airports' waiting areas with many people and without

people. Hence, subjects' scores on perceived restorativeness and its subscales *Being away*, *Fascination* and *Compatibility* of seeing photos of airports' waiting areas without passengers are significantly higher than the scores of seeing photos of airports waiting areas with crowding. However, the score on *Extent* subscale of seeing photos of airports' waiting areas without passengers is significant lower than that of seeing photos of airports waiting areas with crowding (see Table 5.2 & Fig 5.2).

Table 5.2 Statistic data of dependent T-test (Under the condition non-crowding/crowding)

		Mean	N	SD	T	df	p	SE
Pair 1	Being away (non-crowding)	2.96	203	0.98	7.01	202	<0.001	0.08
	Being away(crowding)	2.20	203	1.24				0.09
Pair 2	Fascination(non-crowding)	3.23	203	0.82	5.84	202	<0.001	0.06
	Fascination(crowding)	2.79	203	1.00				0.07
Pair 3	Extent (non-crowding)	2.61	203	1.11	-5.82	202	<0.001	0.08
	Extent (crowding)	3.25	203	1.12				0.08
Pair 4	Compatibility (non-crowding)	3.30	203	0.91	9.77	202	<0.001	0.06
	Compatibility(crowding)	2.32	203	1.08				0.08
Pair 5	Perceived restorativeness (non-crowding)	3.03	203	0.67	6.06	202	<0.001	0.05
	Perceived restorativeness(crowding)	2.64	203	0.79				0.06

Fig 5.2 Mean Comparison within pair (Under the condition non-crowding/crowding)



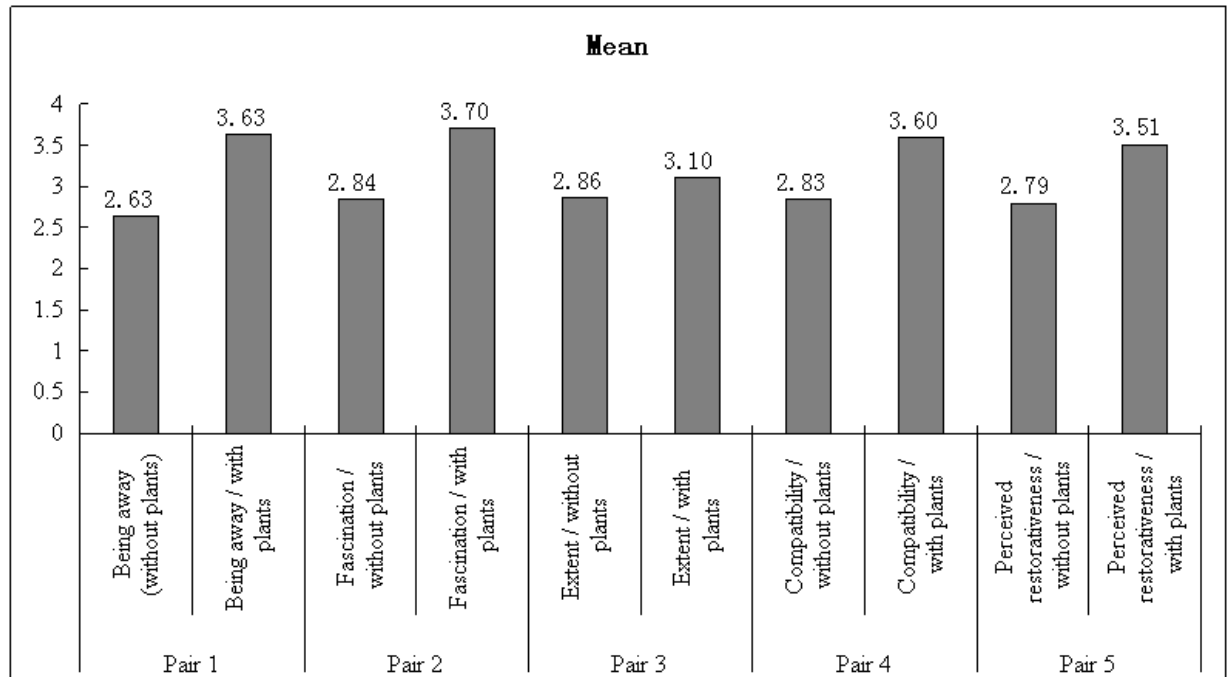
Significant differences were found on subjects’ perceived restorativeness total score between watching pictures of airports’ waiting areas with plant settings and without plants in it. The results of the *Being away* subscale show a significant difference between scores of subjects after seeing pictures of airports’ waiting areas with plants and without plants. The results of the *Fascination* subscale illustrate a significant difference between scores of subjects after seeing pictures of airports’ waiting areas with many plants and without plants. The results of the *Extent* subscale show a less significant difference between scores of subjects after seeing pictures of airports’ waiting areas with many plant settings and without plants settings. The results of the

Compatibility subscale report a significant difference between scores of subjects after seeing pictures of airports' waiting areas with plants and without plants. In a summary, subjects' scores on perceived restorativeness and its subscales *Being away*, *Fascination*, *Compatibility* and *Extent* after seeing photos of airports' waiting areas with many plants is significantly higher than the score of seeing photos of airports waiting areas without any plants (see Table 5.3 & Fig 5.3).

Table 5.3 Statistic data of dependent T-test (Under the condition without plants/with plants)

	M	N	SD	T	df	p	SE
Pair 1 Being away(without plants)	2.63	203	1.11	-9.46	202	<0.001	.08
Being away(with plants)	3.63	203	1.14				.08
Pair 2 Fascination(without plants)	2.84	203	.90	-10.49	202	<0.001	.06
Fascination(with plants)	3.70	203	.86				.06
Pair 3 Extent(without plants)	2.86	203	1.07	-2.13	202	.035	.08
Extent(with plants)	3.10	203	1.20				.08
Pair 4 Compatibility(without plants)	2.83	203	1.00	-7.76	202	<0.001	.07
Compatibility(with plants)	3.60	203	1.06				.07
Pair 5 Perceived restorativeness(without plants)	2.79	203	.74	-10.66	202	<0.001	.05
Perceived restorativeness(with plants)	3.51	203	.74				.05

Fig 5.3 Mean Comparison within pair (Under the condition without plants/with plants)



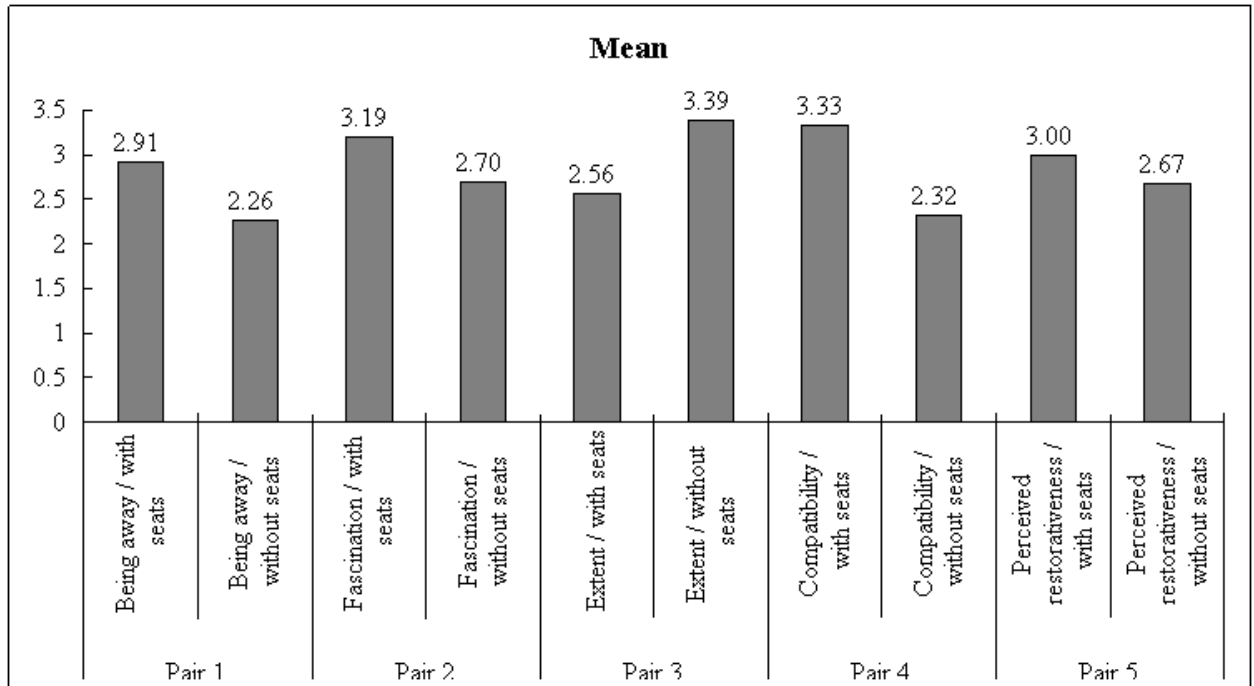
Participants were found to report significant differences on perceived restorativeness between watching pictures of airports' waiting areas with enough seats and without seats. The results of the *Being away* subscale show a significant difference between scores of subjects after seeing pictures of airports' waiting areas with many seats and without seats. The results of the *Fascination* subscale illustrate a significant difference between scores of subjects after seeing pictures of airports' waiting areas with enough seats and without any seats. The results of the *Extent* subscale show a significant difference between scores of subjects after seeing pictures of airports' waiting areas with many seats and without enough seats. The results of the *Compatibility* subscale show a significant difference between scores of subjects after seeing pictures of airports' waiting areas with enough seats and without seats. In conclusion, subjects' scores on perceived restorativeness and its subscales *Being away*, *Fascination* and

Compatibility after seeing photos of airports' waiting areas with enough seats are significantly higher than the scores after seeing photos of airports waiting areas without enough seats. However, the score on the subscale *Extent* has the opposite result. The score after seeing photos of airports' waiting areas with enough seats is significantly lower than that after seeing photos of airports waiting areas without enough seats (see Table 5.4 & Fig 5.4).

Table 5.4 Statistic data of dependent T-test (Under the condition with seats/without seats)

	M	N	SD	T	df	p	SE
Pair 1 Being away(with seats)	2.91	203	1.06	6.49	202	<0.001	.07
Being away(without seats)	2.26	203	1.22				.09
Pair 2 Fascination(with seats)	3.19	203	.89	6.97	202	<0.001	.06
Fascination(without seats)	2.70	203	.87				.06
Pair 3 Extent(with seats)	2.56	203	1.18	-7.31	202	<0.001	.08
Extent(without seats)	3.39	203	1.09				.08
Pair 4 Compatibility(with seats)	3.32	203	1.00	11.43	202	<0.001	.07
Compatibility(without seats)	2.32	203	1.05				.07
Pair 5 Perceived restorativeness(with seats)	3.00	203	.69	6.11	202	<0.001	.05
Perceived restorativeness(without seats)	2.67	203	.74				.05

Fig 5.4 Mean Comparison within pair (Under the condition with seats/without seats)



5.2.2 Results of one-way ANOVA Analysis

One-way ANOVAs were performed to determine whether the differences between the male and the female on the dependent variables were significant. The gender distribution of all participants is shown in Fig 4.2. Significant differences were found on perceived restorativeness (without window), perceived restorativeness (without plants), perceived restorativeness (without enough seats) (see Table 5.5). Among eight scores of perceived restorativeness, only these three scores show significant differences. The mean score of the female participants on perceived restorativeness (without window) is 2.55, and the mean score of the male participants on perceived restorativeness (without window) is 2.93. The mean score of the female participants on perceived restorativeness (without plants) is 2.71, and the mean score of the male

participants on perceived restorativeness (without plants) is 2.99. The mean score of the female participants on perceived restorativeness (without enough seats) is 2.59, and the mean score of the male participants on perceived restorativeness (without enough seats) is 2.85. Male participants score significant higher than female participants on all these three perceived restorativeness.

Table 5.3 Statistic data of ANOVA-Gender

	df	Mean square	F	Sig
Perceived Restorativeness (with windows)	1	.00	.00	.96
Perceived Restorativeness (without window)	1	5.84	10.07	.00**
Perceived Restorativeness (without passengers)	1	.20	.45	.50
Perceived Restorativeness (with crowding passengers)	1	1.38	2.24	.14
Perceived Restorativeness (without plants)	1	3.17	5.95	.01*
Perceived Restorativeness (with plants)	1	.83	1.54	.22
Perceived Restorativeness (with enough seats)	1	.88	1.87	.17
Perceived Restorativeness (without enough seats)	1	2.78	5.25	.02*

One-way ANOVAs were applied to determine whether the differences between the group who likes traveling by airplane and the group who does not like traveling by airplane on dependent variables are significant as well. The statistic data of how many

participants like traveling by airplane and how many participants do not like traveling by airplane is shown in Fig 5.5. Significant differences were found on perceived restorativeness (without passengers), perceived restorativeness (with enough seats) (see Table 5.6). Among eight scores of perceived restorativeness, only two scores show significant differences. The mean score of participants who don't like traveling by airplane on perceived restorativeness (without passengers) is 2.91, and the mean score of participants who like traveling by airplane on perceived restorativeness (without passengers) is 3.10. The mean score of participants who don't like traveling by airplane on perceived restorativeness (with enough seats) is 2.88, and the mean score of participants who like traveling by airplane on perceived restorativeness (with enough seats) is 3.07. Participants who like traveling by airplane score significant higher than participants who don't like traveling by airplane on all these two perceived restorativeness.

Fig 5.5 The statistic data of how many participants like traveling by airplane and how many participants do not like traveling by airplane

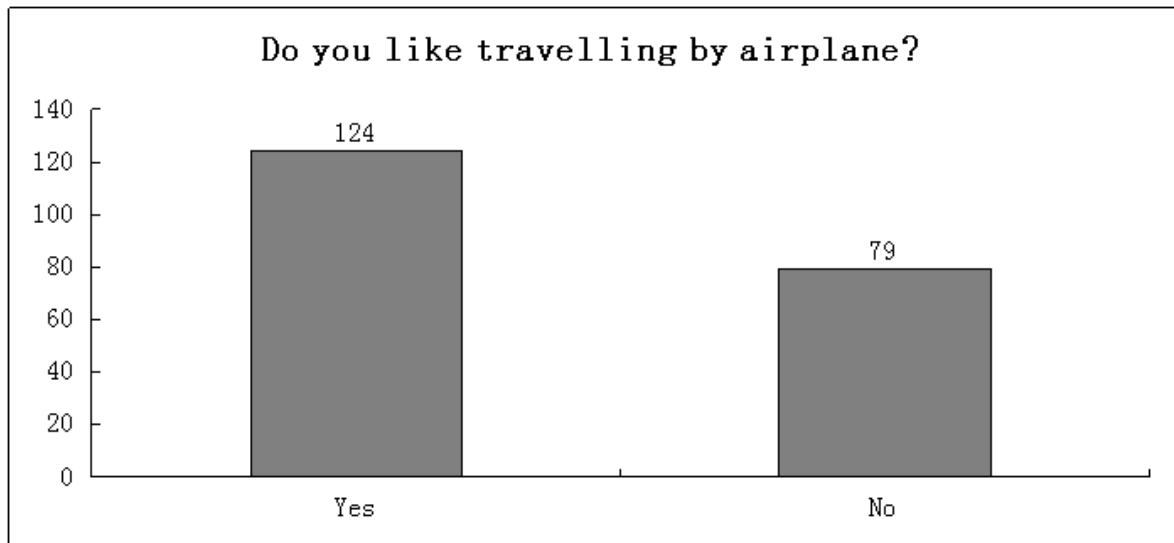


Table 5.6 Statistic data of ANOVA- Like travel by airplane or not

	df	Mean square	F	Sig
Perceived Restorativeness (with windows)	1	.06	.10	.75
Perceived Restorativeness (without window)	1	.15	.25	.62
Perceived Restorativeness (without passengers)	1	1.83	4.16	.04*
Perceived Restorativeness (with crowding passengers)	1	1.31	2.12	.15
Perceived Restorativeness (without plants)	1	.80	1.46	.23
Perceived Restorativeness (with plants)	1	.87	1.61	.21
Perceived Restorativeness (with enough seats)	1	1.83	3.93	.049*
Perceived Restorativeness (without enough seats)	1	.21	.39	.53

One-way ANOVAs were performed to investigate whether there are significant differences between the groups with different frequency of using airlines on dependent variables or not. The categories of participants' frequency of using airlines is shown on Fig 5.6. No significant differences were found on any perceived restorativeness scores (see Table 5.7).

Fig 5.6 The categories of participants' frequency of using airlines

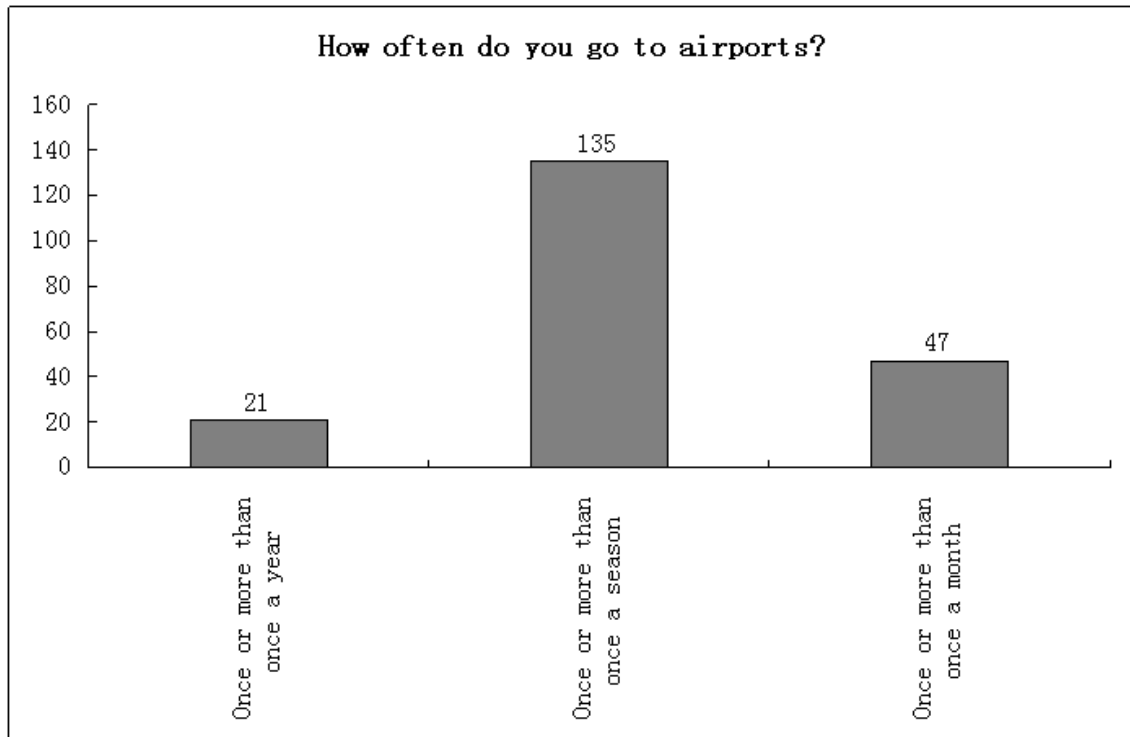


Table 5.7 Statistic data of ANOVA-Frequency of using airlines

	df	Mean square	F	Sig
Perceived Restorativeness (with windows)	2	.28	.48	.62
Perceived Restorativeness (without window)	2	.66	1.08	.34
Perceived Restorativeness (without passengers)	2	.32	.70	.50
Perceived Restorativeness (with crowding passengers)	2	.17	.27	.77
Perceived Restorativeness (without plants)	2	.44	.81	.45
Perceived Restorativeness (with plants)	2	.03	.05	.95
Perceived Restorativeness (with enough seats)	2	.39	.83	.44
Perceived Restorativeness (without enough seats)	2	.00	.00	.99

5.2.3 Possible Factors Influencing Perceived Restorativeness

In the last part of the questionnaire survey, subjects were asked to write down some physical factors that they think may influence perceived restorativeness of airports' waiting areas.

The mentioned factors included: the quality of the air inside the waiting areas, the quality of the seats, the functional media in the airports (such as flight notice or boarding information), the quality and quantity of the facilities (such as dustbins) in the waiting areas, the quality and quantity of the entertainment and commercial services,

the decoration style of the waiting areas, the way-finding systems, the staff and the surrounding passengers, and the temperature of the waiting areas.

There were in total 62 participants answering the last part of the questionnaire. In total, they have written down 103 physical factors which they thought may influence perceived restorativeness of airport's waiting area. The most frequently mentioned physical factor (32/103) is the quality of the seats. 13 out of 103 mentioned physical factors are the materials of the seats, whether it is made of metal, fur or wood. 10 out of 103 mentioned physical factors are the density of the seats (high or low). 9 out of 103 mentioned physical factors are the color of seats, whether it is a cold or a warm color.

The functional media was mentioned second frequently (24/103). The functional media includes the voice announcement and the commercial videos played in the waiting areas of airports. Participants thought the frequency, and the content of the functional media would affect airports' waiting areas' perceived restorativeness.

The third most frequently mentioned physical factor (19/103) is the quality of air inside the waiting area, whether the air is fresh or not, whether it is a non-smoking waiting area or not and whether the smoking area and non-smoking area are separated or not. Most participants (12/19) regarded a waiting area with fresh air, or with separated smoking area to be more restorative.

Other physical factors which were mentioned less frequently are the decoration style (such as color) of the waiting area (10/103), the staff and surrounding passengers (if they are friendly or not) (8/103), the quality of way-finding system (if it is clear or not) (7/103), the quality and quantity of the facilities (such as dustbins) (6/103), the quality

and quantity of entertainment and commercial services (5/103), and whether the temperature inside the waiting area is comfortable or not (3/103).

6. Discussion

This chapter presents the conclusion drawn from the statistical results in 6.1, the limitation of the present study in 6.2 and offers advice for future researches in 6.3.

6.1 Conclusion

Significant higher scores on three subscales (Being away, Fascination and Compatibility) of the Perceived Restorativeness Scale were discovered after participants watching the stimulus material with windows in waiting areas of airports than that without windows. It is consistent with the previous researches (Lether et al., 1998; Kaplan et al., 1993; Kaplan et al., 1998) that windows in working place can give them restorative benefits. The windows provide outside views of the parking apron, sky or other places which may help travelers feel being away with the current environment, offer travelers fascination produced by outside natural scenes and give travelers extra weather information or flight information to fulfill their traveling needs. However, the subscale Extent did not show any significant difference. It is an unexpected result because the windows could expand travelers horizon and give them much more to watch. But this result may be caused by the misleading stimulus material. In the stimulus material, the photos with windows do not show outside view through the windows. Therefore, these photos may have narrowed down the participants' imagination and lead to this result. According to the results, the present study suggests that having windows in waiting areas of airports may enhance its perceived

restorativeness by increasing its own environmental compatibility and evoking travelers' feelings of being away and cause fascination.

Moreover, subjects also rate significant higher score on three subscales (Being away, Fascination and Compatibility) of the Perceived Restorativeness Scale after watching the stimulus material with no people in waiting areas of airports than that with crowding. The presents study shows the same result as research of Evans (1984) that people in crowded environments have less restoration. It suggests that to have fewer travelers in waiting areas will enhance its perceived restorativeness. People can hardly feel being away and have fascination in crowded waiting areas because there is little quiet room for traveler to enjoy the surroundings. And also the crowded waiting areas would be filled in all kinds of information and make it more difficult for travelers to find the information they need. Therefore, to have a proper adjustment of the waiting area so that not too many passengers gather in one waiting area for long times should be helpful. However, the effects on the subscale Extent are opposite to the others. Participants give significantly higher scores for the stimulus material with crowding than that with no people in the waiting area. These results fitted the assumptions, because crowded environments give individuals more content to explore which fits the definition of extent. However, since other three subscales showed significant higher scores on perceived restorativeness when the waiting areas are less crowding, the present study still regards crowding as having an negative impact on perceived restorativeness.

Subjects also score significantly higher on all four subscale (Being away, Fascination,

Extend and Compatibility) of the Perceived Restorativeness Scale towards stimulus material with plants in waiting areas of airports than that without any plants in it. The present results underline the conclusion of previous researchers (Roe & Aspinall, 2011; Raanaas et al., 2011) that indoor natural settings offer soft fascinations to individuals. Also, the plant can offer micro restorative experiences for travelers in waiting areas to make them have the feelings of being away. And the plants can provide rich content for travelers to explore and fulfill the travelers' restorative needs. It suggests that having plants increase restorative benefit for travelers when they are in waiting areas of airports.

Subjects also score significantly higher on three subscales (Being away, Fascination and Compatibility) of the Perceived Restorativeness Scale after watching the stimulus material with enough seats in waiting areas of airports than that without enough seats in them. The present results suggest that to have enough seats in waiting areas of airports will increase its perceived restorativeness by enhancing its own environmental compatibility and offering travelers fascination and feelings of being away. Again they produced an opposite result on the subscale Extent with higher scores for the stimulus material without enough seats in it than that with enough seats in it. This unexpected results may have been caused by the stimulus material as well, because the stimulus materials of waiting areas short of seats showed a lot of standing people. These materials could mislead participants' imagination to a crowded waiting area which has high quality of extent.

In a conclusion, the present result indicates that physical attributes (seats, plants,

windows and crowding) have an influence on perceived restorativeness of waiting areas in airports for travelers. Perceived restorativeness of the waiting area in airports can be increased when the waiting areas in airports have windows, when the waiting areas have abundant seating, when the waiting areas are not crowded and when the waiting areas have plants.

In the present study, gender differences are examined as an influential factor on perceived restorativeness of waiting areas in airports for travelers. There are several studies indicating the possibility of gender affecting perceived restorativeness (Hartig, et al. 1998). In this study, significant differences were found in three of eight perceived restorativeness scores between different gender groups. Also, significant differences were found in two of eight perceived restorativeness scores between the group who likes traveling by airplane and the group who does not like traveling by airplanes. These results indicate that the gender and preference of traveling by airline have little influence on perceived restorativeness. And the influence of frequency of using airlines has not been discovered. These results are unpredictable. However, the influence of gender was not confirmed by all previous studies. And the studies on the influence of preference of traveling tools and frequency of using airlines on restorativeness are also limited. Therefore, further studies need to research more on these questions.

Several conclusions can be drawn from the present study for application or further study. Firstly, airports can benefit from having windows, abundant seats, and plants in waiting areas which will increase perceived restorativeness for travelers. Secondly, proper arrangements or expanding waiting areas' space would also be helpful to increase

restorativeness by reducing the bad influence of crowding.

6.2 Limitations of This Research

6.2.1. Theoretical Limitations

The restorativeness of an environment is not only a simple characteristic only connected to the content of environment, but also a complex system influenced by people's needs (Ivarsson & Hagerhall, 2008). It will be different for different individuals at different time. Some people prefer natural scenes; others may prefer familiar places, like home. Some people prefer short time visit to restorative environment, while others may like longer stay in restorative environment better. Some people may voluntarily seek restorative experiences, but some people may pay no efforts on gaining restorative experiences.

Also, the restorativeness of an environment relates to an individual's past experiences in it. If someone already had terrible memories, such as crowding fear, connected to one place, no matter how good the restorative quality this place may have, it will not evoke an individual's restorative experience in it.

Besides, the restorative experience one individual had in one environment depends on preceding conditions. The depletion of psychological resources decides the restoration people need to and can attain (Hartig et al., 1997). The psychological depletive status can be manipulated by letting participants rest for some time and study

cognitive material for some time. However, the present study did not control the depletion status of participants. Although participants are required to see the same material, the psychological status of them before the questionnaire survey is not controlled. It may have influenced the results on perceived restorativeness.

Another theoretical limitation of this study is that I only measured the perceived restorativeness rather than actual restorativeness. And the perceived restorativeness and the actual restorativeness are different because participants' imagination and participants' actual feelings are different. Valid measurements of actual restorativeness are still needed, however.

6.2.2. Methodology Limitations

Firstly, this research is limited by the narrow range of the sample. The participants of this survey are only students. Even though it most likely to be a good representative of the general population (Daniel & Boster, 1976; Anderson & Schroeder, 1983; Han, 2003), it can not stand for all population.

As for the simulating material, according to the ART, simulated environments which includes photos may require more direct attention from participants than the real one (Kjellgren & Buhrkall, 2010). Therefore, the photos of airports' surroundings may offer less fascination than the actual airport environments. Besides, though research has shown that the simulated natural environments appear to make people feel relaxed to the same extent as the natural environment, the simulated environment cannot make

people feel as the actual nature (Kjellgren & Buhrkall, 2010). Therefore, perceived restorativeness of stimuli environments for the participants will have a bias compare to the perceived restorativeness of an actual environment. Also, the content of the stimulus material would also affect and mislead participants' imagination, such as the crowding in the photos which meant to illustrate a waiting area of airports lacking of seats.

According the procedure, the four physical attributes were only tested individually. The interaction of these physical attributes may have a different influence on perceived restorativeness of waiting areas in airports and cause bias.

Besides, participants are required to see both versions of the stimulus material at the same time which may artificially increase and reinforce the perceived difference of the stimulus material. This may also lead to an experimental bias which increase the impact of physical attributes.

Moreover, even through I changed the presenting order of the categories of stimulus material for subjects, the presenting order of two parts in any one category of stimulus material did not change. This would have led to a bias caused by subjects getting tired at the end of presenting of each group and having stereotypes towards the stimulus material.

6.3 Further Study

Studies in the future may improve the validity by using a broader range of

participants, especially including participants besides college students. Moreover, further studies can use different groups of participants viewing stimuli material with different physical attributes instead of viewing all same stimuli material to investigate the influence of different physical attributes further.

Future studies may try to at least measure and use a control on the direct attention depletion status of participants so that the result can be more accurate. Furthermore, future study can control the participants' gender, age, preference of tourism and frequency of using airlines to investigate their connection with perceived restorativeness throughly.

Although nature is considered to be the most restorative environment, the restorative influence of different natural elements is varying (Ivarsson & Hagerhall, 2008). Future research may also have to look into it. And also future studies may try to divide physical attributes into more specific levels, such as using no people in an environment/ a few people in an environment/ many people in an environment/ crowded in an environment. Therefore, the physical attributes' influence on environment's perceived restorativeness can be investigated more specific.

This research has some limitations in the stimulus material which may have influenced participants' perceptions. Future research should manage to measure the perceived restorativeness of subjects in experimental or real environment.

7. References

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8. Appendix

8.1 Example of Stimulus Material

Fig 8.1 Example of stimulus material focus on windows

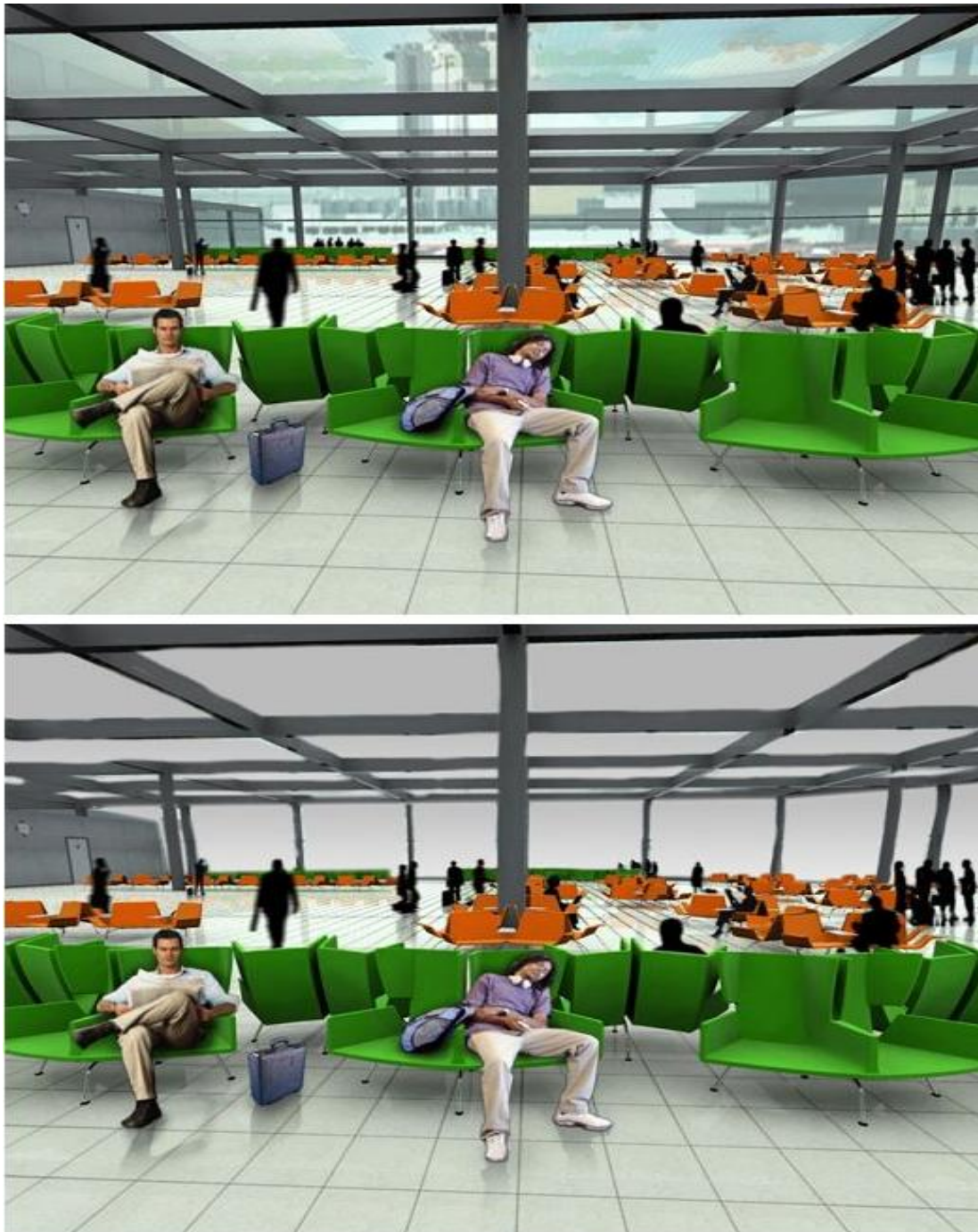


Fig 8.2 Example of stimulus material focus on crowding people



Fig 8.3 Example of stimulus material focus on plants



Fig 8.4 Example of stimulus material focus on seats



8.2 Quantitative Questionnaire

Questionnaire on Travelers' Perceived Restorativeness in Waiting Areas of Airports

Age: _____ Gender: _____

Profession: _____ Nationality: _____

Do you like traveling?

Yes. No.

Do you like traveling by airplane?

Yes. No.

How often do you go to airports?

Once or more than once a month.

Once or more than once a season.

Once or more than once a year.

Less than once a year.

Never.

Imagine you are on a holiday trip and in the waiting areas of airports on the photos we are going to show you. You have plenty time to enjoy the surroundings.

The Perceived Restorativeness Scale

Please rate questionnaire below with a 7-point scale where 0 = not at all, 1 = very little, 2 = rather little, 3 = neither little nor much, 4 = rather much, 5 = very much, 6 = completely.

1 2 3 4 5 6 7 8

1. Being here is an escape experience.								
2. Spending time here gives me a break from my day-to-day routine.								
3. It is a place to get away from it all.								
4. Being here helps me to relax my focus on getting things done.								
5. Coming here helps me to get relief from unwanted demands on my attention.								
6. This place has fascinating qualities.								
7. My attention is drawn to many interesting things.								
8. I want to get to know this place better.								
9. There is much to explore and discover here.								
10. I want to spend more time looking at the surroundings.								
11. This place is boring.								
12. The setting is fascinating.								
13. There is nothing worth looking at here.								
14. There is too much going on.								
15. It is a confusing place.								
16. There is a great deal of distraction.								
17. It is chaotic here.								
18. Being here suits my personality.								
19. I can do things I like here.								
20. I have a sense that I belong here.								
21. I can find ways to enjoy myself here.								
22. I have a sense of oneness with this setting.								
23. There are landmarks to help me get around.								
24. I could easily form a mental map of this place.								
25. It is easy to find my way around here.								
26. It is easy to see how things are organized.								

What else physical settings do you think is important to build waiting areas of airports as restorative environments?
