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**HEALTH AND WELLBEING BENEFITS OF SPENDING
TIME IN NATURE ON URBAN YOUNG ADULTS**

Master Thesis

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This Master thesis has been compiled independently. All works by other authors used while compiling the thesis as well as principles and data from literary and other sources have been referred to.

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INTRODUCTION

Urbanization is on the rise all over the globe, and urban areas will continue to grow with a high population. As results of this continuous growth world face complex challenges by planning for the cities of the future. By 2050, 68% of the world population will live in urban areas (United Nation, 2019 p. iii). People migrate from rural areas to urban areas since urban areas offer better employment opportunities, higher education, health care, and overall life quality improvement (Vlahov et al., 2007, p. 19). Urbanization affects people's lives in both positive and negative ways. The positive side is that it directly links with economic growth and development while offering various benefits for urban dwellers. At the same time, urban environments are crowded, noisy, polluted, complicated and stressful than rural settings (Dye., 2008, p. 767).

World Health Organization (2019) stressed that urbanization remains one of the major health challenges in the 21st century. Urban lifestyle often incorporates busy and stressful, yet physically inactive due to sedentary lifestyle with office work, expansion of transportation in cities, computer, and digitally based work ethics (Dye., 2008, p. 768; Lee et al., 2012, p. 224). Urbanization associated with an increase in physical and mental health conditions in children and adults (Dye., 2008, pp. 767–768). Disconnection from nature may be a direct contributor to these health and well-being complications (Hartig & Khan, 2016, p. 938). Many studies provided scientifically proven evidence that connecting with nature can prevent or reduce physical and mental adverse health outcomes (Capaldi et al., 2015; Kardan et al., 2015; Shananan., 2016; Song et al., 2015).

Several practices and concepts explain natures' healing power of improving human health and wellbeing. The centuries-old Japanese practice of "*Shinrin Yoku*" (absorb the forest atmosphere using human five senses), also known as "*Forest Bathing*", is a widespread practice among Japanese to improve health and wellbeing (Hansen et al., 2017, p.1). In

the later years, this practice has evolved into "Forest therapy", which has the medically proven effects of walking in forests and engaging in forest elements. Worldwide, this practice has recognized as a psychological relaxation and stress reduction activity for people of any age and backgrounds (Park et al., 2007, p. 123). Miyazaki et al. introduced "The concept of nature therapy" in 2015. Nature therapy concept elaborates that exposing to natural elements such as trees, flowers, streams, breeze, bird songs can increase psychological relaxation and boost immune function to prevent many diseases (Miyazaki et al. 2016 as cited in Song et al., 2016, p. 2).

With the rapid growth of urbanization, humankind has been out of touch with nature and lost its connection to the natural world. New generation experience transition from a life predominantly spends outdoors towards a very different life in indoors. Basically, human have changed how they live and ruined their relationship with nature. But there is a need to rebuild human connection with nature since this is key to good health and wellbeing. However, new awareness is emerging, that is driving towards regreening the cities (Lehman, 2019, pp. 3–4). To address adverse health outcomes in the urban population, green spaces in cities such as urban parks, open exercise areas, walking and cycling paths, community gardens, street trees, rooftop gardens play a vital role. In contrast, the urban green spaces add aesthetic value to the urban environment while creating more possibility to reconnect with nature. Many populous cities in the world recently keep attention to regreening cities by establishing green spaces and green infrastructure to improve their citizens' physical, mental, and social wellbeing.

The above-described situation drives towards a more specific problem and inspired the author to study urban young adults' lifestyle, the relationship between urban green spaces and urban young adults' behaviors, physical and psychological effects of spending time in nature and disconnecting factors from nature.

The goal of the thesis is to analyze the health and wellbeing effects of exposure to urban green spaces and identify the causes for growing disconnection from nature then, offer recommendations for urban young adults to improve their health and wellbeing and adjust their lifestyle by reconnecting to nature. Following research questions have been designed as a help to achieve the current thesis goal:

1. What are the physiological and psychological health and wellbeing benefits obtained by exposure to nature /urban green spaces?
2. Which factors cause a growing disconnection of urban young adults from nature?

To answer the research questions, the author established the following research tasks.

1. Compiling a literature review on the topic of nature therapy, forest bathing and forest therapy, health and wellbeing benefits of spending time in nature, relationship between urban green spaces and human health and wellbeing, Urbanization, urban lifestyle, and its adverse health outcomes for urban young adults.
2. Designing and conducting the research using experimental method and semi structured interviews to find out lifestyle of urban young adults and physical and psychological differences before and after spending time in nature/urban green spaces.
3. Analyzing the result of research using statistical and thematic analysis.
4. Drawing conclusions and presenting suggestions for improvement of lifestyle, the health and wellbeing in urban young adults.

The thesis consists of two main chapters. The first chapter discusses the theoretical overview of the main areas of the study under the four subchapters: health and wellbeing benefits of spending time in nature, nature connection activities, the relationship between human health and urban green spaces, and negative effects of urban living on young adults. The second chapter presents the methodology of the investigation of urban young adults in nature. The subchapters of the second chapter explain research design, research findings and the discussion and recommendations.

1. LITERATURE REVIEW

1.1. Health and wellbeing effects of exposure to nature

Human lives are complex and the ideas about health and wellbeing change over time as well as vary between life stages and cultures. One can describe health and wellbeing in a positive way, and another can define it in a negative way. To establish a common definition of health and wellbeing, World Health Organization (2020, p. 1) defines health as “a state of complete physical, mental, and social wellbeing, marked not only by the absence of disease infirmity”. According to this definition health and wellbeing are interconnected and based on the individual’s subjective viewpoint on their physiological, psychological, and social state. Further, a German theologian, Dietrich Bonhoeffer defined health as “a strength to be; the health is the ability to pursue our life story without insurmountable obstruction from illness” (Misselbrook, 2014, p. 582). The concept of wellbeing is utterly complex and yet the question of how it should be defined remains unanswered. By considering significant past definition of wellbeing, Dodge et al. (2012, pp. 229, 230) focused on three key areas to move closer to a new definition (see Figure 1.1). The three key points are: the idea of set a point for wellbeing, inevitability of equilibrium and fluctuating state of changes and resources.

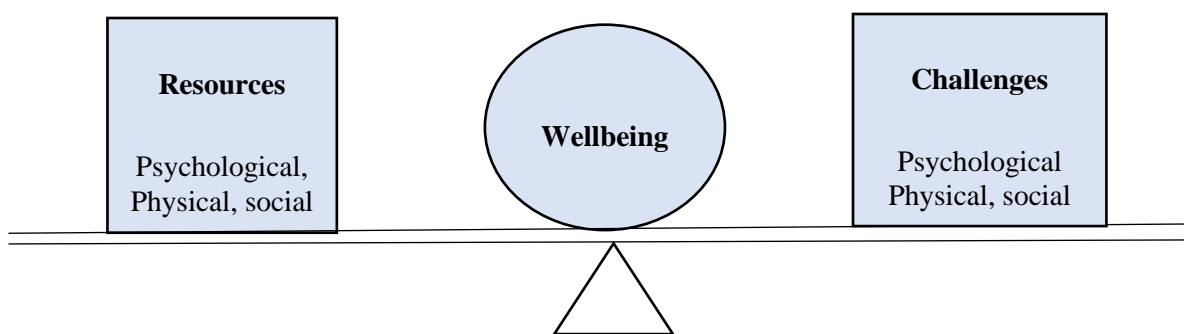


Figure 1.1. Definition of wellbeing. Source: Dodge et al., 2012, p. 230

Some scholars have discussed the structure of wellbeing by considering psychological satisfactions. Diener & Suh expressed that wellbeing consists of three main components: life satisfaction, pleasant moods and emotions, unpleasant moods, and emotions (1997, p. 200). Another research added more aspects to wellbeing: fulfil goals, life satisfaction and happiness (Pollard & Lee, 2003, p. 59). However, considering the above-discussed explanations from the previous studies, it is clear that wellbeing is a combination of positive physiological and psychological aspects to be fulfilled in life.

Spending time in natural environments refers to good health and wellbeing and many experimental studies provide evidence for positive health and wellbeing. It has been identified through multiple pathways, including physical, psychological, emotional, social, occupational, and spiritual wellbeing. Ways of spending time in nature refers to walking in urban parks, engaging in forest bathing or forest therapy activities, physical activities in outdoor spaces, connecting with urban community gardening, or just relaxing in a natural environment (Kardan et al., 2015; Richardson & Michell, 2010; Song et al., 2015).

First, it is essential to focus on major theories related to nature and health. The author identified a few theories that account for health and well-being benefits of spending time in nature through the past literature. Kaplan and Kaplan's (1989) Attention Restoration Theory (ART) asserts that human can concentrate better, after spending time in nature or even after watching nature sceneries from a window. Further this theory discusses, the natural environment has plenty of "soft fascinations" such as clouds floating in the sky, the wind blowing through the tree leaves or water flowing in a stream that help people make effortless attention. ART proposes that soft fascination provides benefits to reduce daily stress, experiencing the situations in a relaxed way, engaging in activities without any conflicts, and critically experiencing the stimuli from the soft fascination. (Kaplan & Kaplan, 1989, p. 195)..

Ulrich (1986) formulated Stress Reduction Theory (SRT) based on several studies conducted in a hospital setting to explain emotional health and physiological reaction in the presence of the natural environment. SRT explains that looking at a green environment or expose to the green environment can create positive psychological

responses. These emotional responses are unconscious, immediate, and spontaneous and accompanied by increased positive vibes and reduced arousal. (Ulrich, 1986, pp. 29–44).

The reason for nature is beneficial for physical health seems easy to understand since natural environment indicates a large amount of oxygen and low amounts of pollutants, the air quality is good for several health outcomes. As well as phytoncide, negative air ion, natural sights, natural sounds, natural temperature can be mentioned as active ingredients from nature to enhance physical health (Kuo, 2015, p. 5).

Richardson & Michell (2010) shared knowledge about how the environment can impact cardiovascular and respiratory disease. The study confirmed that males living in urban greener areas had modest 5% lower risk for cardiovascular diseases and males living in urban greener areas had considerable 11% reduced risk for respiratory diseases (Richardson & Michell, 2010, p. 572). Mitchell & Popham (2008, p. 1658) studied income-related health inequalities in populations with a greater amount of natural environment. The study shows that the inequality of all-cause and circulatory disease mortality related to income deprivation is lower in populations who live in the greenest areas than those who live in less green areas. Another study (Kardan et al., 2015, p. 9) conducted in a greater urban area in Toronto Canada, highlighted how much a tree in the street or neighborhood park could improve health. Study revealed that people who live in the street with a higher density of trees report to better overall health and less cardio-metabolic conditions compared with people who live in the street with a lower density of trees.

Japan is one of the famous destinations for using nature as a therapeutic source. Therefore, many studies related to nature and health can be found in Japanese environmental context. A study taken place in Japan using middle-aged hypertensive individuals demonstrates that heart rate had significantly reduced when participants expose to forest area compared to when they walked in the urban setting (Song et al., 2015b, p. 2692). Moreover, Ochiai et al. (2015a, p. 15228). reported that after the forest walk, heart rate was significantly lower in the Japanese middle-aged females. The drop-in heart rate reflects that they are more relaxed in the forest environment.

A dose-response analysis for high blood pressure suggests that visits to nature 30 minutes or more during a week can reduce the blood pressure risk up to 9% (Shanahan, 2016, p.1). Scientific evidence of another study conducted using high blood pressure elders shows that forest environment has therapeutic effects of reducing the blood pressure level (Mao et al., 2012, p. 500). Walking in a forest notably decreased the systolic and diastolic blood pressure on older women (Lee & Lee, 2014, p. 9). Another study revealed that 20 minutes walking in a forest atmosphere beneficial to lowering blood pressure in young male students (Park et al., 2008, p. 127). Another study has conducted by Park et al. in 2009 (p. 297) to examine the physiological effects of forest recreation on male university students. The results shows that heart rate and diastolic blood pressure measurements were significantly lower on participants after the time spending in forest environment. Overall, the study concluded that lowering heart rate and diastolic blood pressure helped participants to produce significantly comfortable and calmer feelings. Hartig et al. (2003, P.116) conducted a study to compare stress reduction and attention restorative effects in natural and urban field settings. The study findings indicated that blood pressure level has significantly decreased those who viewed trees and vegetation compared to those who did not have a view.

While many studies have proven nature's physical health benefits, there are evidence that nature is hugely beneficial for psychological health improvement and overall quality of life. A controlled field study (Grazuleviciene et al., 2016, p. 7) conducted in Kaunas, Lithuania, indicated that even 30-minute walk in an urban park had positive effects on stress relief compared to the participant walked in an urban street. The participants exposed to the urban street setting experienced negative effects on stress relief after seven days of walking. Another group of researchers (Repke et al., 2018, p. 13) have been studied how does nature exposure make people healthier. The study results indicated that nature exposure and nature accessibility from the residential place reduce depression, anxiety, stress and improve overall health and wellbeing. Furthermore, the Japanese study (Song et al., 2015, p. 2693) explains the stress effects of using Japanese middle-aged hypertensive individuals. The study results highlighted that significant increase in comfortable, relaxed, and natural feelings in participants who walked in the forest environment than the urban street. Ochiai et al. (2015a, p. 15266) highlighted that spending time in a forest environment can lower the cortisol level, directly affecting

middle-aged women's stress reduction. Moreover, the participants were reported more relaxed, comfortable, and increased the positive feelings after the time spend in the forest environment. Since most of the studies focused on healthy adults, Ochiai et al. (2015b, p. 2539) conducted another experimental study to assess the psychological effects of relaxing in the forest environment on middle-aged males with high normal blood pressure. The study results confirmed that participants felt more comfortable, relaxed, significantly reduced negative emotions and increased positive emotions after relaxing in the forest environment. The results were more similar to the study results of the study conducted using healthy females. Walking in a nature reserve also highlighted lower the blood pressure within the first 10 minutes, and it indicated more significant stress reduction than walking in an urban setting (Hartig et al., 2003, p. 116).

A study (Sonntag-Öström., 2015, p. 612) has conducted on forest-based rehabilitation experience for a group of patients with server exhaustion disorder. At the beginning of the study, the patients were experienced difficulties to adjust to the forest environment. However, they gradually appreciated the forest environment and noticed peace of mind, mood improvements towards positive feelings, boost the energy, and some patients took the initiative for the new behaviors to positively adjust their lives. Hartig et al. (2003, p. 118). confirmed through a comparison study done in nature and urban setting, walking in a natural environment decreases anger and aggression and increases positive emotions towards life in urban young adults. Takayama et al. (2014, pp. 7225–7226) conducted an experimental study to investigate the wellbeing effects of short-term forest walking and viewing. The experimental participants divided into two groups, and one group assigned to expose the city environment. The other group were exposed to the forest environment, and both groups were followed walking and viewing sessions in given environments. The study results show that mood improvements, positive emotions, vitality level and restorative effects on participants were greater in the forest environment than in the city environment. Another experimental study has carried out in Helsinki capital of Finland, and the participants of the study visited three different environmental settings on separate days. Environmental settings were city center, an urban park, and an urban forest. In this study researchers were measured participants restorative outcome and the vitality levels in different environmental settings. The results confirmed that forest and park

environment showed more restorative effects and increased vitality score compared to the city environment (Ojala et al., 2019, p. 67).

Moods play an essential role in human life. It strongly influences happiness, enjoying the moment, appreciating things in life, coping with stress, and the overall quality of life. One study (Barton & Pretty, 2010, p. 3949) confirmed that green exercise improves self-esteem and overall mood. Further, the study reveals that green exercise helps to overcome mental health problems. Spending time in nature also refer to activities with natural elements such as climbing a tree or mountain. This kind of activities also reported as a way to improve physical and psychological wellbeing (Gathright et al., 2006, p. 142). A psychological testing study (Gathright et al., 2006, p. 148) has compared the differences in climbing a live tree in a forest and climbing a concrete tower in the same forest. The results indicate that tree climbers have increased vitality, positive emotions and considerably decreased tension, confusion, and fatigue while climbing the tree than concrete tower climbers.

Furthermore, theoretical analysis of hedonic and eudemonic wellbeing by reviewing many studies on the mental health benefits of spending time in nature, suggests spending time in nature is one way to flourish in life (Capaldi et al., 2015, p. 9). Many people have access to natural environments such as urban green spaces, community gardens, nature trails or even their natural backyards. These sources may benefit stress relief and overall wellbeing in humans without spending money. Even though many studies proved that spending time in nature is beneficial for health and wellbeing, our society still not fully considered to utilize nature as a vital mental health-promoting source. Another study (Choe et al., 2020, p. 9) related to mindfulness-based stress reduction has conducted by assigning participants to three different environments: a public nature park, an outdoor courtyard, and a seminar room. All three groups of participants allowed to experience the mindfulness session, and the effects were measured. The results highlight that connecting to nature involves a sense of meaningful and worthwhile life. Furthermore, results show that conducting a mindfulness program in the natural environment has more positive effects on stress relief than the other two environments.

Moreover, another several meta-analyses summarized and evaluated spending time in nature offers solutions physical and psychological health and wellbeing problems such as

obesity, cardiovascular diseases, depression, anxiety and overall satisfaction of life. The solution of spending time in nature can be both prevention and treatment for these health and wellbeing negative conditions (Frumkin et al., 2017, p. 10). Including Frumkin another group of researchers highlighted the effect size of spending time in nature by analyzing several studies. The evidence from a previous study (Hartig et al., 2014, p. 221). argued that spending time in nature has small effects on health and wellbeing compared to fundamental components such as income, job, education, and behaviors.

To conclude the health and wellbeing effects of exposure to nature, the above scientific studies provided clear evidence. As physiological benefits, the studies highlighted that lowering heart rate, blood pressure. As psychological benefits of exposure to nature, studies confirmed that attention improvement, stress relief, depression, and anxiety reduction, enhance restorative effects, higher vitality level, mood improvements, positive emotion, and overall life satisfaction enhancement. According to discussed evidence, human nature relationship seems essential for everyone within every culture and life stages.

1.2. Nature connection activities

Human beings have been communicating with natural environments since ancients' time and all the human activities were adopted to the natural environment. The idea of nature comes from science, and it has a more profound link with human societies. However, nature is a broad word to define (Ducarme & Couvet, 2020, p. 1). Several studies based on environment refer to nature as trees, flowers, lakes, beaches, rivers, mountains, forests, animals, urban community gardens, urban parks, urban green spaces and all the natural elements. The human evolutionary date back to five million years from today and throughout the evolution until today, natural environment plays a vital role. Today human are living in a modern civilized society and still nature is a part of human evolution since human may have the chance to absorb nature to be comfortable and relaxed (Lee et al., 2012, p. 325).

The history of nature therapy dates to the sixth century. To enhance human health and wellbeing, the first Persian empire "Cyrus the Great" grew a garden in the middle of the capital city of Persia. In the sixteenth century, the Swiss-German physician Paracelsus

stated: "The art of healing comes from nature, not from the physician" (Hansen, 2017, p. 2). Nature therapy is also known as ecotherapy, Clinebell first invented the term ecotherapy in 1996. The word ecotherapy explains a form of ecological spirituality that a holistic connection with nature incorporates both natures' ability to nourish human through the contact with nature and human ability to reciprocate this healing connection through their potential to nourish nature (Jordan & Hinds, 2016, p.1). Miyazaki et al. introduced concept of nature therapy, and that clearly explains nature therapy "as a set of practices aimed at achieving preventive medical effects through exposure to natural stimuli that render a state of psychological relaxation and boost the weakened immune function to prevent diseases". Nature therapy associates with boosting immunity, preventing diseases and promote overall health and wellbeing by connecting to nature (Miyazaki et al. 2016 as cited in Song et al., 2016, p. 2).

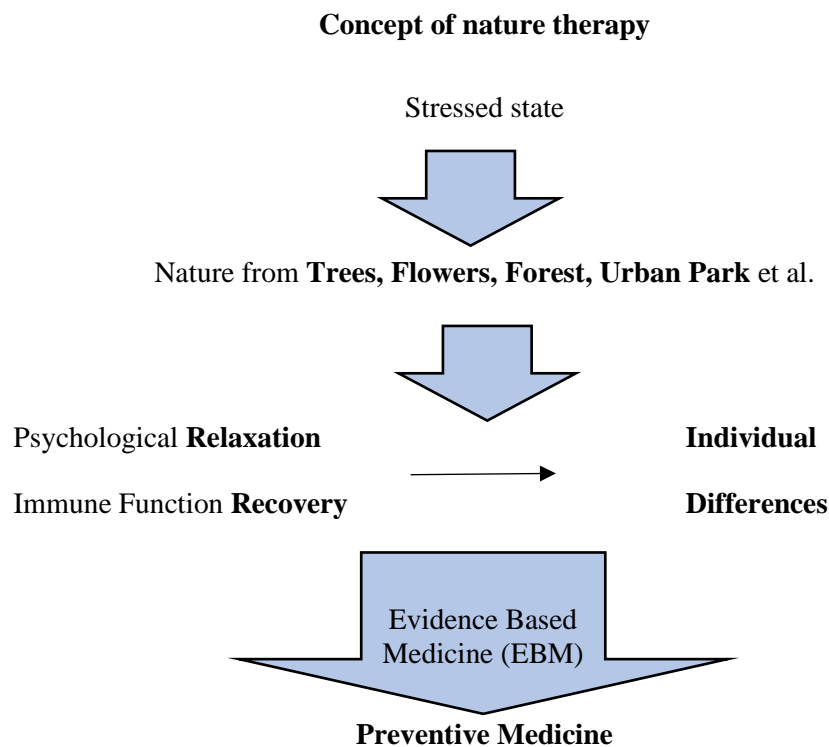


Figure 1.2. Concept of nature therapy, Source: Miyazaki et al. 2016 as cited in Song et al., 2016, p. 2

Moreover, forest bathing (*Shinrin-Yoku*), the traditional Japanese practice, can be considered a form of nature therapy. This practice based on the Japanese term *Shinrin-Yoku*, coined by Tomhide Akiyama of the Japanese Ministry of Agriculture, Forestry, and

Fisheries in 1982 (Plevin, 2018, p. 17). *Shinrin-Yoku* translation in English is forest bathing, and it means to absorb the forest atmosphere using human five senses. This practice offers to immerse health and wellbeing benefits for human. Since that forest bathing has become an essential practice for the Japanese to prevent illnesses and improve healing in Japan medicine (Hansen et al., 2017, p. 1).

Even though the term *Shinrin-Yoku* established in early 80s, this practice has its roots back to centuries as a mindfulness activity in Japanese culture. Ancient people in Japan identified some elements in nature such as mountains, trees, stones, and rivers as spiritual and sacred, and they used to honor those elements. Forest bathing practice already spread worldwide, and many people practice it to overcome stress, anxiety, and many other physical and psychological health issues happened due to the modern urbanized world (Plevin, 2018, p. 17).

While considering nature therapy and forest bathing, there is another term related to nature healing practices called "forest therapy". Japanese Forestry Agency considered the health and wellbeing outcomes of absorbing forest into human senses, and they decided to provide the blueprint for the "Forest Therapy Stations project" in 2005. Main idea for forest therapy came from the term "aromatherapy" (Lee et al., 2012, p. 327). A forest therapy trip to the woods helps the participants relax and reenergize while breathing the fresh air with hundreds of forest smells called phytoncide (wood essential oil). Those organic compounds from trees enhance human natural killers cell activity (Li et al., 2009, pp. 952–957).

In Japan, 64% of the lands are covered with forests. Therefore, engage with forest therapy or forest bathing is easy. According to a public opinion poll conducted in Japan in 2003, 25.6% of the participant responded that they have participated in a forest bathing trip. 56.8% of the participant said that the interest to spend their next vacation in a forest or mountain area. Moreover, 66.6% of the participants responded that they would like to experience forest bathing as a health and wellbeing enhancing practice (Morita et al., 2007, p.55).

In forest therapy programs in Japan, groups involved in immersive nature walks. They get an invitation to slow down the phase of their everyday lifestyle and reconnect with

the natural elements such as trees, flower, water, soil, and temperature of the environment, sounds and smells around them. In this practice, participants are free to smell the forest scents from natural elements such as wildflowers, leaves, soil, or moss. They also get the chance to listen to the forest sounds that they can absorb as a calming forest story, and they allow to taste the wild edibles, guided meditation, chance to play with water nearby streams (Plevin, 2018, p. 19). Furthermore, forest bathing and forest therapy are easily accessible practice, and it is possible anywhere in the world in the environments such as urban parks, green spaces or even a backyard with trees (Li, 2009, p. 10)

Recently, people adopted Japanese forest therapy practice to promote eco-tourism, wellness tourism, or as a clinical healing practice (Plevin, 2018, p. 19). Tourism activities based on the rural environment is expected to play an essential role in the tourism industry. It is becoming popular among the tourists those who are seeking relaxing getaways for their vacations. Among rural environment tourism, forest bathing and forest therapy are popular practices, although forest therapy has considered as more clinical practice and effects of forest therapy are evidence-based in contrast to forest bathing (Ohe et al., 2017, p. 323). Further, Ohe et al. defined forest therapy tourism as a form of rural health tourism since rural forest areas help to achieve psychological and physical relaxation. Upon this definition, they concluded forest therapy tourism aims at preventive medicine rather than offering medical treatments for tourists. The study highlighted forest therapy based on rural tourism are important, and it helps to build a more health-conscious society.

Literature seems rather small, concentrating on health and wellbeing, based forest bathing and forest therapy tourism. Rural natural environment-based tourism mainly can be found in a few studies conducted in Nordic countries. (Komppula & Konu, 2017; Konu et al., 2010; Hjalager & Flagestad, 2012). A case study from Finland explains developing the forest-based wellbeing tourism service for Japanese tourist. The tourism service adopted the Japanese practice of forest bathing to give them a relaxation activity associated with spending time in Finnish forests (Komppula & Konu, 2017, p. 51). Nature-based rural tourism is popular in Eastern Finland since there are many lakes and forests surrounded by. The lake wellness product includes nature and lakes to provide relaxation, comfort and experience of peace and quietness in the countryside for the target customers. This

nature and lake tourism product benefits align with the activities of spirit and mind, self-development, and health-promoting and healthy eating (Konu et al., 2010, p. 137). Another study (Hajalager & Flagestad, 2012, p. 731) discusses innovations in the wellbeing tourism industry in Finland, Denmark, Sweden, Iceland, and Norway. According to their discussion, the four-day nature wellbeing package elaborated and tested with Danish families with children. It helps adult and children to take a breather from day-to-day digital device usage. This wellbeing package aligned with spending time in nature and absorb its benefits for body and mind. The four-day wellbeing package teaches tourists to live in nature, feel the joy of walking in forest areas, and experience the rivers. The studies suggest that forest bathing, forest therapy, and nature therapy or tourism activities related to nature align with wellness and wellbeing tourism, helping to make a mentally and physically healthy society. While eco-tourism became one of the major trends in the tourism sector, combining the eco-tourism method to wellness and wellbeing services associated with nature would create health-conscious and environment-conscious society.

When discussing forest bathing, forest therapy or nature therapy, it is important to know the seasonal impact to perform these practices. Few studies mentioned seasonal forest bathing forest therapy; thus, the knowledge is very limited. A study conducted in Poland in winter season, validate the effects of short winter forest bathing on mental wellbeing enhancement (Bielinis et al., 2018, p. 277). Moreover, this study reflects that participants significantly improved mood, positive effects, restoration, and subjective vitality. Overall, the study confirms winter forest bathing brings psychological relaxation (Bielinis et al., 2018, p. 282). Another recent study (Bielinis et al., 2021, pp. 9–12) has conducted in Finland to measure the psychological effects of winter forest bathing. The result shows that the environment with the ground and trees covered in snow, positively influences the mood state. While contrasting previously mentioned Polish study (Bielinis et al., 2018), with the Finnish study (Bielinis et al., 2021) shows that participants were significantly improved their mood state. Moreover, Finnish study confirmed that winter forest also offer restorative benefit and participant were significantly increased their restorative level as same as the previous Polish study. According to the Finnish study, subjective vitality measurements were relatively low than the Polish study results. While comparing the previous study, this might be specific for the Finnish population. The people in Nordic

countries often see winter season as a difficult period of the year. Lack of sunlight and longer dark day time make them depressed.

However, the above literature reflects human nature relationship date back to human history and it is a much-necessary connection for human to improve all the aspects of their lives. The concepts related to nature wellbeing such as nature therapy, forest bathing(*Shinrin-Yoku*) and becoming popular and that can address as a solution to many of modern world problems.

1.3. Relationship between urban green spaces and human health

While the previous sub-chapters provide evidence of how nature helps to improve human health and wellbeing, it is essential to consider different landscapes and their health and wellbeing benefits for human. Several studies explored the health and wellbeing benefits of natural landscapes such as forests, seaside, mountains and desert.

Forest landscapes offer direct and indirect effects and contribution to human health. By providing herbs and wild foods, forests nourish human, and its therapeutic healing power, including rehabilitation benefit, provide mental relaxation (Nilsson et al., 2011, p. 13). Further, many studies confirmed that exposure to the forest environment offers physical benefits such as boost the immune system and decrease the illness (Song et al., 2016, p. 2; Lee & Lee, 2014, p. 9; Park et al., 2008, p. 127) There is growing evidence showing the interconnection between coastal areas (ocean and seas) and positive human health and wellbeing. The coasts also offer a greater source of healthy food (Fleming et al., 2014, p. 16), and another study shows that the people who live closer to seashores have greater wellbeing than those who live inland (Wheeler et al., 2012, p. 1200). Another study shows that exposure to coastal areas can significantly improve mental health benefits and reduce the risks for depression and anxiety (Garrett et al., 2019, p. 8).

Mountains and hill environments play a leading role in the provinces of nature contribute to people. The aesthetic value and the cool climate of the mountain areas attract all kind of tourists and travelers. One study has confirmed that journey through the Alpine mountains last several days offer positive psychological health in human (Arnberger et

al., 2018, p. 15). Desert landscapes are often categorized under low priority landscapes. Although, a study conducted in northern Kenya using desert communities confirmed that physical and mental wellbeing better integrated with desert living (Dan et al., 2021, p. 8).

Since the world is going through a fast urbanization process, many people do not have the opportunity to expose natural landscapes often. As a solution for this problem, urban authorities and urban policymakers constantly work to establish green spaces within city areas to avoid significant disengagement from nature in city dwellers. While people are rapidly moving from rural areas to urban areas, disconnecting from nature directly affects human health and wellbeing (Maller et al., 2008, p. 1). Even though urban areas have a fewer natural element, but also recreational elements such as street trees, green rooftops, community gardens, urban parks, green open spaces, cycling, and walking pathways provide ecological benefits indirectly. This type of spaces known as “urban green spaces” and defining the term varies widely. Urban green spaces can be mentioned as part of green infrastructures. Those green spaces play a vital role as a health promoting settings for all the urban dwellers. It is therefore necessary to make sure that urban green spaces are easily and freely accessible for all the communities within the cities (World Health Organization Regional Office for Europe, 2017, p. 2). According to that, built environment elements in urbanized areas, such as the urban parks, children’s play areas, community gardens, nature reserves, green rooftops, walking and cycling paths can be identified as urban green spaces.

People in major cities in the world have no connection with nature during their everyday life. Therefore, many major cities offer easily access urban parks withing the city limits by providing opportunities to connect with nature (Hartig & Kahan., 2016, p. 938). It is not a fact to argue that urban green spaces improve air quality, reduce heat impact as well as add aesthetic value to the urban environments (Kardan et al., 2015, p.1). Some experimental research demonstrated that interconnecting with urban green spaces can increase human health and wellbeing (Simkin et al., 2020; Hunter et al., 2019; Dadvand et al., 2015; Song et al., 2015; Abraham et al., 2009). Abraham et al. (2009) highlighted three main health and wellbeing areas through the framework of health promoting impact on green spaces in urban areas (see Figure 1.3).

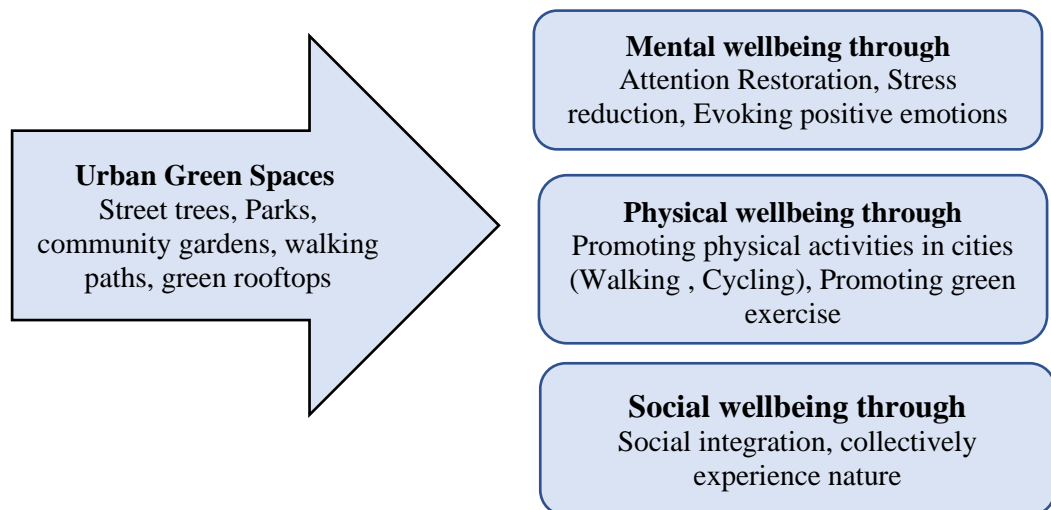


Figure 1.3. Framework of urban green spaces, Source: Abraham et al., 2009, p. 64

A study (Engemann et al., 2019, p. 5190) shows that level of childhood green space exposure affects adult psychiatric disorders. The children who spent their childhood in lower green spaces than children who lived in the highest green spaces were associated with 15 to 55% to high risk of intellectual disabilities in their adult age. Another study (Dadvand et al., 2015, pp. 7940–7941) conducted to investigate green space exposure effect of cognitive development in school age highlighted that more greenness associated with better school performance and better working memory. The children exposure to urban pollutant and less green environment often found problems with their cognitive development.

Moreover, a study (Birch et al., 2020, pp. 8–9) carried out in one of the United Kingdom’s urban areas to reveal how urban nature can support young adults' mental health and wellbeing. The result highlighted that those young adults feel secured in urban green spaces. Young adults who live in cities fluctuate with challenges such as financial issues, changing priorities, relationship issues and many more challenges. Moreover, some participants highlighted that lack of human support for their mental wellbeing was influenced to get support from urban green spaces. Overall, this study further revealed that urban green spaces could be a stress relief source to young adults in the cities and positively impact their mental health and wellbeing. Therefore, investing on establishing and maintaining urban green spaces in cities are important. Another study (Hunter et al., 2019, p. 10) conducted in urban nature, using urban dwellers to reflect that spending time

in urban nature produced a significant decrease in the stress hormone cortisol. Simkin et al. (2020, pp. 7–10) conducted an experimental study to investigate the restorative effects of urban commercial forests, urban recreational forests, and old natural forests. The experimental study participants were guided to follow 30 minutes walking and 15 minutes viewing session in each forest environment. After experimental studies in each environment, researchers measured the participants' restorative outcomes. The results show that participants were increased restorative effects in all forest areas. The urban recreational forest was less restorative than the old natural forest and urban commercial forest. Although in the study conclusion, the researchers suggested that it is essential to establish recreational urban forests and preserve commercial and old natural forests close to residential areas. More evidence shows from a study (Taylor et al., 2018, p. 197) that took place in the two most populous cities in Australia and New Zealand and draws the attention to general, personal, and psychological wellbeing through two biodiversity indicators: bird species richness and "Normalized Differences Vegetation Index (NDVI)". Further the study suggests that living in urban areas can make stress in urban population, and immediate nature in the urban environment can support to cope with the stress (Taylor et al., 2018, p. 206).

While many studies provide evidence supporting the psychological effects of urban nature, Song et al. (2015a, p. 14224) conducted a study to prove that there are both psychological and physiological positive effects of walking in urban parks. The study results show that heart rate was significantly lower, and participants were noticed psychological relaxation effects after walking in urban parks. Further, the result indicates that urban areas should have simply accessible and cost-effective nature contact methods to improve the quality of life and promote the health and wellbeing of the urban population. Another study (Grazuleviciene et al., 2016, p. 7) has conducted in an urban park environment to investigate positive health benefits on coronary artery disease (CAD) patients. In this study, participants were divided into two groups and one group allowed to walk in an urban park, and the other group allowed to walk in an urban street. The result shows that 30 minutes short visit to an urban park has positive effects on cardiac respond as well as stress reduction compared to an urban street environment.

It is a common knowledge that daily physical exercise contributes to both physical and psychological health. By modifying the indoor physical exercise, modern urban society adopted to the “green exercise”. It is simply daily exercise performed in a natural environment such as urban parks, nature walking paths or cycling paths (Mackay & Neill, 2010, p. 238). A study conducted to explore short term effects of green exercise, and the result highlights that green exercise such as road walking and cycling help to reduce anxiety in a significant way. The overall findings claimed that green exercise helps to enhance mental health in the urban population. These evidence shows that general exercise doing in nature can enhance both physical and mental wellbeing (Mackay & Neill, 2010, p. 243).

In general, much research focused on the health and wellbeing benefits of urban green spaces. Nevertheless, how much could tree in the neighborhood street improve human health also interesting to know. Focusing on that, a group of researchers conducted a study in a large urban center in Toronto, Canada, to reveal the relationship between neighborhood tree density and human health. The study result suggests that people who live in neighborhoods with a greater coverage of trees in their residential pathways show much healthier and lower cardiometabolic problems than people who live in a lower density of trees in their residential streets (Kardan et al., 2015, p. 8). Another Canadian study (Nisbet et al., 2020, p. 11) highlights that trees and other vegetation in the neighborhood enhance human health and wellbeing while improving more nature aspects such as providing homes for birds and other wild creatures. Further, the study findings provide the insight that trees in urban areas help improve air quality, and it is a straightforward way to reach good health and wellbeing. Many evidence regarding green space indicators have been found and one study (Mears et al., 2020, p. 6) shows that green density, accessibility, garden size, cleanliness of the green space have a considerable connection between positive health outcomes. The study results highlighted that cleanliness of the green space associated with a lower rate of depression.

By considering the above literature regarding health and wellbeing benefits of urban green spaces and green indicators, it is important to draw attention to the urban youth perception of green spaces in cities. A study (Orîndaru et al., 2020, p. 7) has taken the initiative to discuss future action to making the cities greener and youth perception on

what a sustainable city means to them. The study shows that many urban people are interested in improving more green spaces within the cities, and the concept of “urbanization” is becoming popular. Further, the urban youth is concerned about the disconnecting with nature and other problems such as air and water quality and health impacts; hence, citizens are willing to make their cities greener areas. The study suggests that many people expect that the government should take the initiative to make the cities green and is the only responsible party to overcome negative urbanization outcomes. But the urban citizen could take their own initiatives to make their lives greener and healthier (Orîndaru et al., 2020, p. 11).

Overall, above literature highlight the vital role that urban green spaces can play in shaping healthy citizens in urban areas. It is well explained through the past literature how urban green spaces and some indicators of urban green spaces are important to enhance physical and psychological outcomes in urban dwellers as well as satisfy their nature needs easily. By utilizing these evidence, urban policymakers can implement health concerned- urban environment policies. Ecologists and environmental health scientists must encourage urban policymakers and urban landscape planners to design health-promoting green infrastructure to overcome health and well-being problems among the urban population.

1.4. Negative effects of urban living on young adults

Urbanization is a complex socio-economic process, and it takes a long time. In 1950, 30% of the world population were urban. In 2018 it increased to 55%, by 2050 it will rise to 68% of the world population. Urban dwellers are rising drastically since many urban areas offer the highest quality public and private services, and essential services are also easily accessible than in rural areas (World Urbanization Prospects, 2018, p. iii, 1). Improved life conditions such as housing, education, health care, nutrition and employment are the main facts of urban migrations (Vlahov et al., 2007, p. 19). Even though health care and nutrition improvement associated with urbanization, on the other hand, there are many illnesses shifts from acute childhood physical and mental conditions to adult chronic diseases and non-communicable diseases such as mental health (Song et al., 2015, p. 14224).

With the drastic change of urbanization over the past few decades, natural spaces and agriculture lands have decreased and replaced with an artificial environment. Pollution is becoming a major issue, and air and water quality directly connect to human health-related problems (Pronczuk & Surdu, 2008, p. 151). Due to these factors, climate changes taking over the vast impact and urban areas have been reported as higher temperature zones as well as some areas act as urban heat islands. Urban high temperature leads to heat stress and sensational discomforts issues, and heat-related mortality seems likely to increase in future (Patz et al., 2005, p. 315). Outdoor air pollution is ambient pollution that leads to several major health issues. The urban population often exposed to a high amount of air pollutant because of more vehicles and industrial emissions in urban areas. This cause to various health issues and stages of greater and lesser seriousness. Especially children, older people, and people with diabetes and predisposing heart or lung disease would easily be affected by air pollution in urban areas. Some diseases caused by air pollution appear short-term impacts such as irritation of the eyes, nose, skin, throat, wheezing, coughing and chest tightness, and breathing difficulties. Short term exposure to urban air pollution can cause headaches, nausea, and dizziness. Long-term exposure to air pollution and long-term health issues such as asthma, pneumonia, bronchitis, and lung can be dangerous, leading to death. Respiratory diseases and multiple cardiovascular problems also associated with inhaling air pollutant in urban areas (Manisalidis et al., 2020, pp. 7–8).

Further, urban life leads to less physical activity due to sedentary behaviors, such as sit style office work and computer and other digital device usage (Dye, 2008, p. 768). The rapid growth of car ownership in cities and comfortable transportation also lead to physical inactivity in the urban population. Physical inactivity leads to diabetic, breast and colon cancers, obesity, premature deaths (Lee et al., 2012, p. 224). In the previous section of the literature, the author has shown how urban green spaces help eliminate physical inactivity through urban parks, green spaces, walking and cycling paths, and green exercise activities. A Portuguese study (Machado-Rodrigues et al., 2012, p. 123) shows that urban youth of both males and females spend less time in physical activities than rural youth. Work in with digital devices increase the screen time, including watching television and video games, leads to sedentary behaviors among urban youth.

While considering urban dwellers health and wellbeing, mental health appears a major issue and much more attention must focus on that. Urban living affects its populations' brain biology, and some stressors cause the development of mental disorders. Social stress is the most major fact in the increased risk of mental disorders in urban areas identified as chronic social stress (Adli, 2011, pp. 1–2). High population density, high rates of criminality, social isolation, and noise are some of the urban stressors (Peen et al., 2010, p. 84). Urban crowded areas deliver many noises from vehicles, people, and factories and these noises associated with increased social stress since the environment becomes uncontrollable for individuals. Living in the urban environment interacts with different parties in society and affects mental health disorders such as chronic stress or mood changes. Moreover, urban dwellers often experience changes in their lives, and it changes their chronobiological rhythm frequently. It also caused urban chronic stress (Adli., 2011, p. 2). According to the data from a study (Taylor et al., 2018, p. 207) based on New Zealand and Australia, demonstrated that urban life has a unique suite of stressors to the urban citizen.

Even though digitalization in society leads to comfort peoples' lives, on the other hand, it causes mental stress among urban dwellers. Expansion of information technology and a significant increase in digital device usage technostress "technostress". Technology is everywhere now, whether at home, work, or leisure; it does not matter people embrace technology all day long. Especially, smartphones and other smart devices can feel people comfort, and at the same time, it may act as a disaster for human mental health (Osiceanu, 2015, pp. 1137–1138). Meta-analyses (Peen et al., 2010, p. 91) showed that city dwellers have a substantially increased risk for 21% anxiety disorders and 39% mood disorders. Another study (Oswald et al., 2020, p. 38) revealed that in recent decades have increased young people's engagement with screen-based technologies and a reduction in young people's contact with nature. According to the study, high screen time and low green time affect urban young adult's health and wellbeing.

Another study (Thomee et al., 2007, p. 1312) conducted in Sweden investigated whether a high quantity of information and communication technology use is a risk factor for developing psychological symptoms among young adults. The study result shows that young adults who use computer or mobile devices associated with stress and symptom of

depression. Number of Short Message Service (SMS) per day and online chatting associated with prolonged stress. Moreover, emailing is associated with depression, internet surfing, phone calls, and SMS per day associated with the risk of developing sleep disturbance. Overall, this study suggests that the use of information technology may impact young adults' mental health disorders. Work stress among urban young adults also rising, and attention must be given to work-life balance to make them physically and mentally balanced. A study (Melchior et al., 2007, p. 1119–1129) has tested the influence of work stress on diagnosed depression and anxiety in young working adults. The result shows that young adults exposed to excessive workload and extreme time pressures showed a risk of major depression or generalized anxiety disorder than those young adults with less stress with their job responsibilities.

However, urbanization is an essential process for social and economic development, and people cannot emit it, instead of planning cities more human health-friendly way. Stimulating the conversation between urban planning and urban human health are vital since urbanization is rapidly growing and threatening human health. Urban areas should modify into high-density urban villages by establishing nature elements such as urban parks, gardens plots, light rail transportation, horticulture gardens with more ecological value. Urban policymakers should establish physical and mental health protectives in urban areas to protect urban dwellers from the increasing risk of mental health problems and physical health problems. If the urban areas have natural elements, it would be a potential problem solver, an inexpensive intervention to address many health issues among urban dwellers.

To sum up the literature review, many scientific studies investigated that spending time in nature may improve human health and wellbeing. Healing properties in nature such as senses, sounds, scents, and visuals are beneficial for reducing stress, anxiety, and depression, improve positive moods, vitality level, the satisfaction of life and general wellbeing. Physical health conditions such as cardiovascular diseases, high blood pressure, and heart diseases also can reduce from spending time in nature. Moreover, it is proven that nature can improve the social aspects of human life too. Since the modern world is rapidly transforming its rural areas into urban areas, nature elements replace many artificial infrastructures that do not appear as health protectives in urban areas.

Urban dwellers expose to cities' stressors, which led to difficult physical and mental health conditions. Instead of rising artificial infrastructure, urban planning should include more green spaces such as urban parks, open spaces, walking and cycling paths, open exercise areas. Such places can play a vital role in urban dwellers to improve their health and wellbeing.

According to the literature, while much research has provided evidence that nature has health benefits, less attention has focused on urban young adults' lifestyle and how urban nature can improve their health and wellbeing while exposing to the urbanized society. Urban young adults often incorporate busy lifestyles, but they mostly experience physically inactive and digitally driven activities, leading to several mental and physical health problems. Therefore, through the rest of this study discovers how urban nature can be beneficial for urban young adults.

2. AN INVESTIGATION OF URBAN YOUNG ADULTS IN NATURE

2.1. Research design

People and their social behaviors are constantly changing. Therefore, it is essential to research and establish new knowledge of social sciences. Research is defined as search again for new knowledge. It can be a systematic or scientific search to validate data on a specific topic (Kothari, 2004, p. 1).

In this chapter, the researcher elaborated the research design, data collection methods, sampling method, data analyzing method and the research findings of the present study. According to the literature review of the present study, the main problem has identified as negative health and wellbeing outcomes among urban young adults caused by the growing disconnection from nature. The researcher chose mixed methodology for this study since it allows this type of studies to collect relevant data to find answers to the research questions. The mixed method allows both qualitative (open-ended) and quantitative (closed-ended) data collection in responses to the research questions. Qualitative and quantitative both data collection methods have its own strengths and limitations (Creswell, 2014, pp. 264,265). The current study related to health and wellbeing subject area and many studies (Simkin et al., 2020; Bielinis et al., 2018; Takayama et al., 2014) in the similar subject area has been conducted using quantitative method and Brich et al. (2020) recently conducted a similar study using qualitative method. The researcher of the current study decided to combine both quantitative and qualitative data collection methods to develop a stronger understanding of the research problem and find in accurate and in-depth answers to the research questions.

The researcher conducted the experimental study (Simkin et al., 2020; Bielinis et al., 2018; Takayama et al., 2014) to gather quantitative data. According to the referred past studies, the researcher understood that conducting the experimental study is the most reliable way to gather physical and psychological data to measure the health and wellbeing benefits of spending time in nature. Since the experimental study does not provide enough data related to nature preferences, nature habits, and disconnecting factors from nature on urban young adults, researcher decided to conduct also semi structured interviews (Brich et al., 2020) with the same experimental participants. The semi structured interviews allowed researcher to gather qualitative data from the participants with their own insights of the topic. Both data collection methods gathered primary data covering all the relevant aspects to address the research problem and the research questions.

Initially, the researcher's plan was to conduct the experimental study as a whole group including similar numbers in both genders in the last week of March 2021. Due to the imposed Covid 19 pandemic restrictions by the Estonian government from 11th of March to 25th of April 2021 (COVID-19 Crisis webpage Estonia, 2021) group gatherings were not allowed in Tallinn. Therefore, researcher had to change the initial plan and reduce the sample size. Then the researcher took a maximum of two participants at a time for the experimental study and conducted similar experimental studies eight times to complete with 15 participants. Experimental studies and semi structured interviews conducted from 15th to 30th of March 2021.

Experimental study consisted with physiological and psychological data measurements in two stages (pre stage/ post stage). Under the physiological data measurements, heart rate (Song et al., 2015a; Park et al, 2009) was measured using "Fitbit versa 2 activity band" and blood pressure (Lee & Lee, 2014, p. 6; Ochiai et al., 2015b; Park et al., 2009) was measured using "A&D Medical digital blood pressure cuff monitor – Model:UA-651". The researcher measured restorative outcome and the vitality level of the participants under the psychological measurements using valid and reliable scales, The Restorative Outcome Scale (ROS) and Subjective Vitality Scale (SVS). These scales have been using for previous studies (Bielinis et al., 2021; Bielinis et al., 2018; Takayama et al., 2014) to measure restorative and vitality effects of the spending time in nature.

The experimental studies were taking place in Kadriorg Park, Tallinn, Estonia. The researcher selected this experimental site since it is one of the popular urban green spaces in Tallinn and easily accessible by public transport within 10–15 minutes from the city center. One part of the study site is finely maintained garden type, and the other part is covered with giant tree canopies, pine trees and the shrub layer. Nature viewing session took place in the tree canopy area since it has more natural elements to observe. There were no leaves in the trees only several pine trees were green. All the experimental studies conducted during the daytime and most of the days were sunny with soft breeze. Figure 2.1 clearly explained all the steps that have been followed while conducting the experimental study.

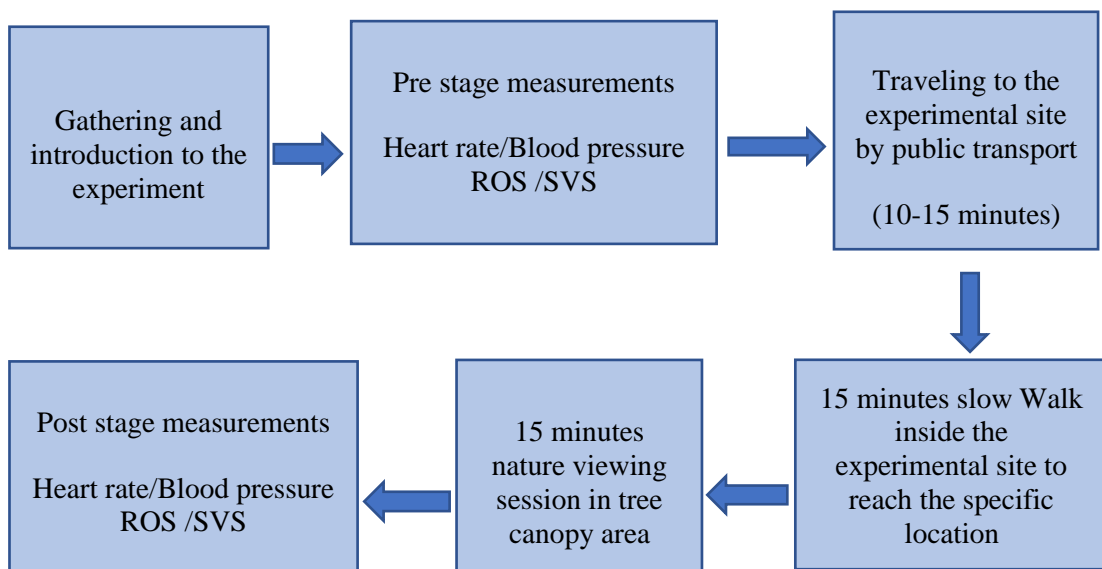


Figure 2.1. Schedule of the experimental study

Each day, participants were gathered in front of the Tallinn University Academic library, which is situated in the city center. The researcher made a brief introduction to the experimental study and explained participants to confidentiality of the study. Participants were informed that the collected data strictly use only for the thesis purpose. After the introduction and verbal consent, the pre stage psychological and physiological measurements were noted. Participants were asked to fill ROS and SVS scales. Then researcher measured participants' heart rate and blood pressure. Later, the participants along with the researcher traveled to the experimental site, Kadriorg Park, by public transport. Before entering the experimental site, researcher asked participants to switch

off their digital devices and not to use them during the experimental study. Then the participants were guided to take a slow walk towards the tree canopy area in the experimental site.

Slow walk took approximately 15 minutes and once the participants arrived the location that supposed to do the nature viewing session, researcher advised them to observe nature (trees, breeze, sun, sky and clouds, bird chirping) for 15 minutes. Participants allowed to view the nature by sitting or standing as they were comfortable but advised them to keep the distance and silence among other participants. The researcher explained that how the participant can observe nature, mainly watching the surrounding nature and pay attention using their five senses. Further researcher advised them to touch the surfaces of the trees, tree trunks, pine cones, leaves, sticks and whatever the natural elements that they can easily find around them. Also advised to pay attention to the sky and clouds, sounds of nature such as bird chirping, and tree rustling and feel the warmth of sun ray and breeze. There were few similar studies conducted by Bielinis et al. (2018) and Park et al. (2009) and proved that 15 minutes in nature viewing is enough to induce the restorative benefits of nature on human.

Slow walking in the nature and viewing nature landscapes are considered as preliminary activities of forest bathing (Park et al., 2007, p. 125). After the 15 minutes of nature viewing session, the researcher took the post stage psychological measurements by requesting participants to fill out ROS and SVS scales again. Then the researcher measured physiological measurements of their heart rate and blood pressure levels again (Bielinis et al., 2018, p. 278).

To discuss more about psychological scales, ROS is a valid and reliable instrument used for many previous studies to measure restorative benefits (Bielinis et al., 2021; Bielinis et al., 2018; Takayama et al., 2014; Ojala et al., 2019). This scale has six items that are related to restorative emotions and cognitive outcomes in a given environment. Each item follows by a seven-point Likert scale (from 1–Not at all to 7–Completely). In this study, the author adopted ROS modified by Takayama et al. (2014, p. 7212). The six items are “1. I feel calm,” “2. I feel focused and alert,” “3. I have enthusiasm and energy for my everyday routine,” “4. I feel restored and relaxed,” “5. I can forget everyday worries” and, “6. My thoughts are clear” (see Appendix 1).

SVS is a commonly used instrument for vitality investigations. In general, there are two versions of SVS, and one measures traits, enduring characteristics of individuals, positively to self-actualization and self-esteem, and negatively to anxiety and depression. The other version measures subjective vitality effects rather than its enduring aspects (Takayama et al., 2014, p. 7212). Both versions contain seven different items, each item follows a seven-point Likert scale from 1– Not at all to 7–Completely). The reliability of the SVS has confirmed through several studies (Nix et al., 1999; Ryan & Frederick, 1997) and many similar studies (Bielinis et al., 2021; Bielinis et al., 2018; Takayama et al., 2014; Ojala et al., 2019) used SVS to measure vitality level. The present study used the SVS modified by Takayama et al. (2014, p. 7212) and in this modified version only contained four items with a seven-point Likert scale. The four items are “1. I feel alive and vital,” “2. I do not feel very energetic,” “3. I have energy and spirit” and, “4. I look forward to each new day” (see Appendix 2).

After the experimental studies, semi structured interviews (Brich et al., 2020) were conducted for each participant and the interview took approximately 15 minutes to 20 minutes. Interviews were conducted at the same experimental study site. The researcher used pre-arranged semi structured questionnaire that contains thirteen open ended questions (see Appendix 3). At the beginning of the questionnaire several demographic information were asked including age, career, or study statues, and living area. Ten out of thirteen questions of the questionnaire were formulated based on the past literature (Brich et al., 2020; Simkin et al., 2020; Ojala et al., 2019). The question number 12 and 13 were compiled by the researcher. The researcher compiled the questions number 12 because it was firmly connected to the research questions. The question number 13 was formulated according to connect the study topic to the prevailing COVID 19 pandemic situation. First question of the questionnaire set as an ice breaker since it allowed participants to easily open with their thoughts for the study topic. The researcher asked permission to record the interviews from the participants and five participants stated that they are uncomfortable to speak while recording. Then the researcher had to take notes for their interviews, and the rest of the interviews were recorded.

The quantitative data were analyzed using both descriptive and inferential statistical method (Takayama et al., 2014). The inferential statistical method was used to make a

generalization about the study population from the sample data. The researcher used descriptive statistical method as well to present the data more clearly using graphical illustrations. Pair *t*-test were applied to compare pre stage and post stage data measurements from the experimental study. Data are expressed as mean scores and *p* values, $p < 0.05$ was considered statistically significant. All statistical analysis were performed using Microsoft Excel 2016. Qualitative data collected from semi structured interviews were analyzed using thematic analysis method. The thematic analysis was used since that is suitable and convenient for categorizing and identify patterns of the data set from semi-structured interviews. The researcher transcribed all the interviews and coded the data into the themes. Themes used for the analysis were Psychological benefits, Nature recreational habits, Urban nature preferences, and Nature disconnection factors.

The study sample consisted with 15 participants and all of them were voluntarily recruited. There were several selection criteria applied to recruit the participants. The age group of the participants was between 20 to 30 years old and must be an employee, student, or both as well as participants must be living within the Tallinn city limits. Even though the participants currently live in Tallinn, Estonia, they were from three different nationalities including Estonian, Russian and Sri Lankan. Due to the reason of government restrictions regarding the COVID 19 in the study on going period, the researcher had to conduct the study with a small sample. Therefore, only female participants were recruited for the convenience of the research, maintain the similarity of the sample and to increase the validation of the study results by limiting to similar sample.

The purposive sampling (Brich et al., 2020, p. 4) method was applied to recruit voluntary participants within the above-mentioned selection criteria. None of the participants reported a physical health condition or previous psychological disorder. All the participants declared that they are currently incorporating a busy lifestyle. Some of them mentioned that they are occupying two occupations, some are studying and working.

2.2. Research findings

2.2.1. Statistical findings from the experimental study

This section of the study focuses on the presentation, analysis, and interpretation of study results regarding the health and well-being effects of spending time in nature, nature preferences, and disconnecting factors from nature on urban young adults living in Tallinn, Estonia. 15 participants were taken to the experimental study and semi-structured interviews. The coding was made to identify participants as P1, P2, P3,....P15.

As the first step of the data analysis, participants' demographical data (see Appendix 4) were analyzed to understand each participant background. All the participants of the study were between the age of 23 to 30 year and currently occupying with a busy lifestyle as urban young live in Tallinn, Estonia. According to the participants nationalities, majority of them are Estonians (P1, P3, P7, P8, P9, P10, P14, P15), five Sri Lankans (P2, P4, P5, P6, P13) and two Russians(P11, P12).

Participants' study and work background were analyzed to understand their daily life workload. Five participants (P1, P2, P4, P7, P13) stated that they are currently occupying half time jobs and full-time studies. Four participants (P3, P11, P12, P14) stated that they are full-time employees. Two participants (P5, P15) stated that they are occupying with full-time employment and full-time studies. Another two participants (P9, P10) stated that they are occupying a full-time job and half-time studies. P8 was a full-time employee and a small business owner. P6 was a freelance worker and full-time student.

None of the participants stated that they currently suffer from physiological or psychological health problems. Moreover, participants were identified according to their childhood dwelling areas as well. Among the study group, seven participants (P4, P5, P6, P10, P11, P13, p15) stated that they lived in greater urban areas in their childhood, three (P1, P3, P9) in semi-urban areas and five(P2, P7, P8, P12, P14) lived in rural areas.

During the experimental study, participants' heart rate and blood pressure level were measured in two stages under the physiological health data measurements. The heart rate showed significantly lower after the spending time in nature compared to before going to the nature.

The paired sample t-test has been applied to compare the mean score differences between pre stage and post stage heart rate values of the participants. The results indicated significant statistical difference ($p < 0.05$) between pre-stage and post stage data. Post-stage mean score value is 6.6% lower than the pre stage mean score value. Table 2.1 shows the statistical results of pre stage and post stage heart rate measurements.

Table 2.1. Statistical results of pre stage and post stage heart rate variable

Variable	P value	Pre stage		Post stage	
		Average (mean)	Standard deviation	Average (mean)	Standard deviation
Heart rate (BPM)	0.00016	78.7	6.9	73.5	5.4

Below Figure 2.2 illustrated the distribution of heart rate among the experimental participants. It clarifies each participant's differences in heart rate measurements between pre and post stages of the experimental study.

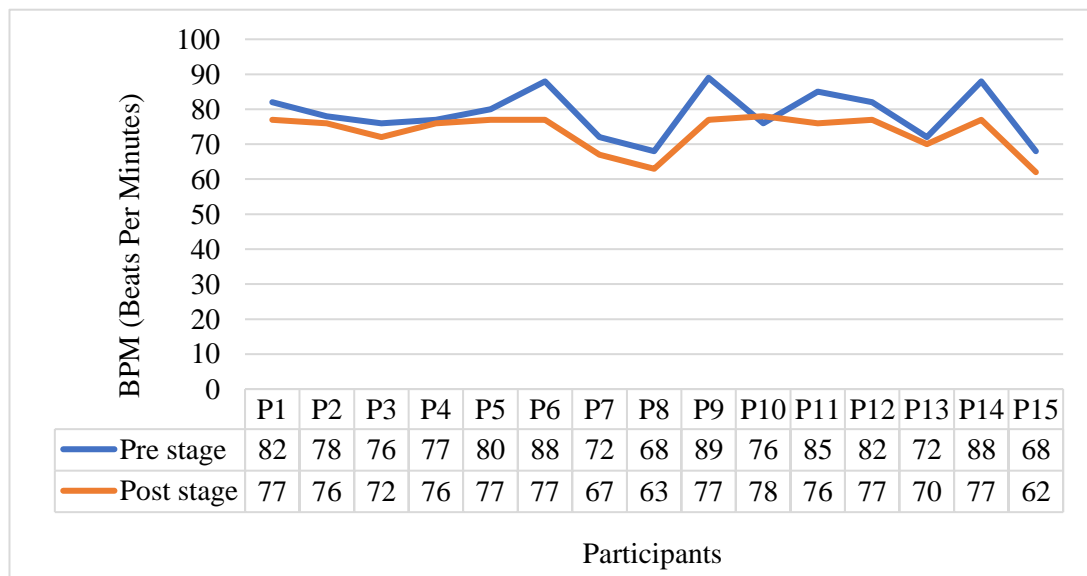


Figure 2.2: The distribution of heart rate among the participants in the pre and post stages

During the experimental study, only one participant (P10) showed that the heart rate was slightly higher in the post stage measurement. The participant's heart rate showed 76bpm in the pre stage of the experiment and it increased as 78bpm in the post stage of the

experiment. All the other participants showed that significant lower heart rate measurements after the spending time in nature.

Pre and post stage blood pressure measurements were compared using paired sample *t*- test. Both systolic and diastolic blood pressure were significantly lower after spending time in nature. Table 2.2 shows the differences of both systolic and diastolic blood pressure measurements between pre stage and post-stage.

Table 2.2. Statistical results of pre-stage and post-stage systolic and diastolic blood pressure measurements

Variables	P values	Pre stage		Post stage	
		Average (mean)	Standard deviation	Average (mean)	Standard deviation
Systolic blood pressure (mmHg)	0.00028	108.7	11.9	107.1	12.4
Diastolic blood pressure (mmHg)	0.018	73.7	9.2	71.5	8.6

Post-stage mean score of systolic blood pressure shows 1.5% lower than the pre stage measurements. The p value of the systolic blood pressure measurements was statistically significant ($p < 0.05$). Similarly, post-stage mean score of the diastolic blood pressure measurements indicated 2.9% lower than the pre-stage measurements.

Figure 2.3 and Figure 2.4 illustrated the distribution of systolic and diastolic blood pressure among the experimental study participants. The figures provide a clear picture of each participant's differences in both systolic and diastolic blood pressure measurements between pre-stage and post-stage.

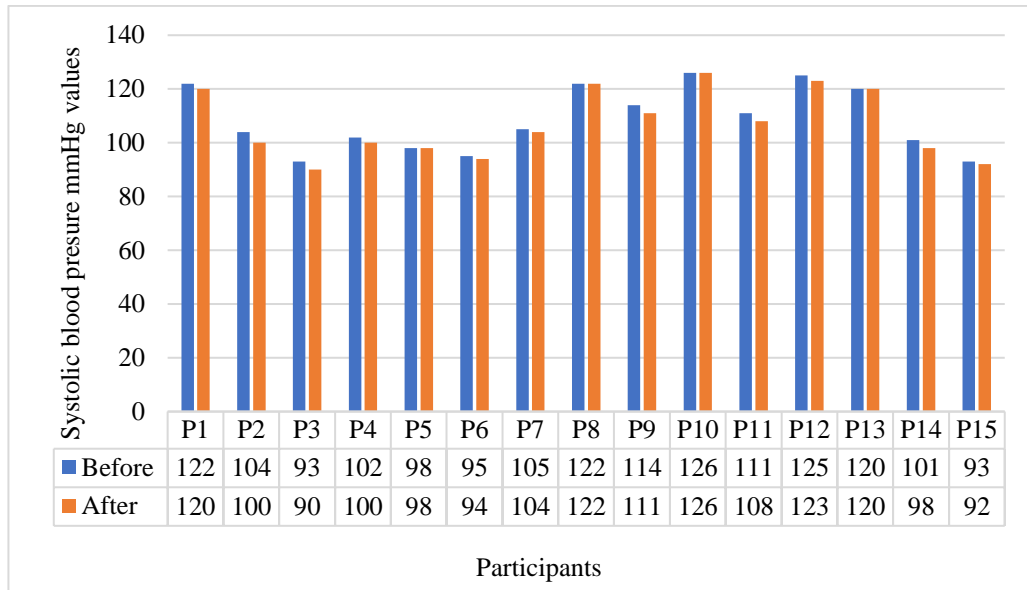


Figure 2.3. The distribution of systolic blood pressure values among the participants (pre and post stages)

According to the above figure, 12 participants showed slightly lower level of systolic blood pressure values in the post-stage of the experimental study than the pre-stage. The other three participants (P5, P8, P13) indicated that the exact systolic blood pressure measurements both pre-stage and post-stage measurements.

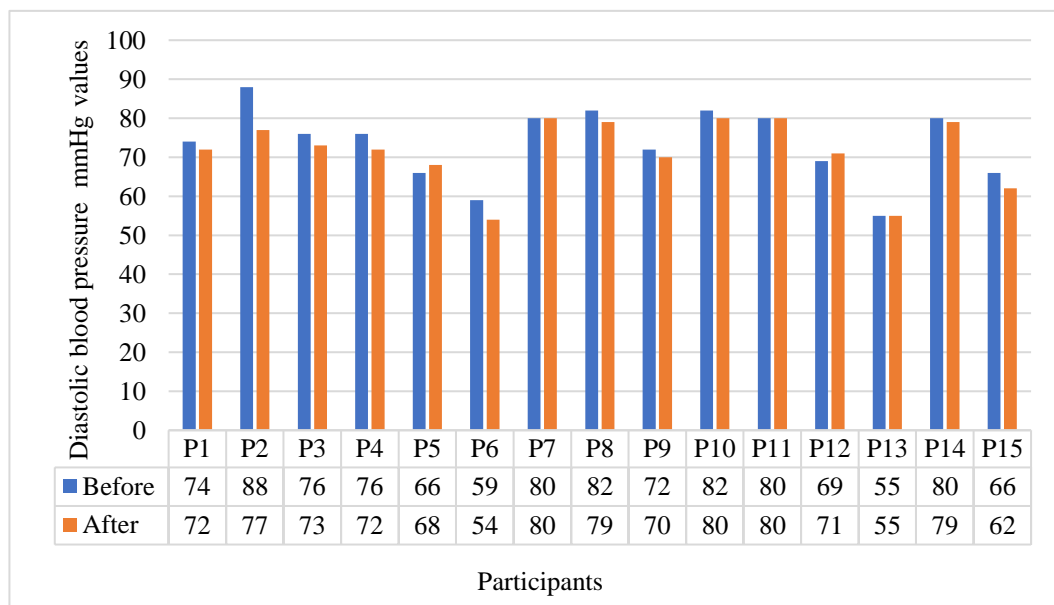


Figure 2.4. The distribution of diastolic blood pressure values among the participants in the pre-stage and posts-stage.

Figure 2.4 shows, diastolic blood pressure measurements were lower on 12 participants in the post-stage measurements than the pre-stage measurements in the experimental study. The other three participants (P7, P11, P13) indicated diastolic blood pressure levels as same as before the experiment. Only one participant (P13) showed that both systolic and diastolic blood pressure levels remained similar in both pre- stage and post-stage during the experimental study.

Further, by considering overall both systolic and diastolic blood pressure indications in both pre- stage and post-stag, it is confirmed that the majority of the participants showed lowering of blood pressure values after spending time in nature than before going to the nature. P10, the only participant who showed the higher heart rate in the post-stage of the experimental study than the pre-stage, indicated the exact systolic blood pressure level in both pre- stage and post-stag and reduced diastolic blood pressure level in post-stage of the experimental study.

All these statistical results of heart rate values and blood pressure values in both pre and post stages suggested a favorable effect on lowering heart rate and blood pressure after spending time in nature than before going to nature.

Table 2.3 shows the comparison of the results of ROS statements between pre-stage and post-stage during the experimental study. All the six statements in ROS were tested by applying paired sample t-test. The results indicated that each question of the ROS was statistically significant ($p < 0.05$).

Table 2.3: Statistical results of ROS (Pre-stage and post-stage)

Statements	Mean response(Pre stage)	Mean response(Post stage)	P values
I feel calm	2.8	4.8	8.E-06
I am focused and alert	3.1	4.5	0.0058
I have enthusiasm and energy for my everyday routines	3.3	4.7	0.0139
I feel relaxed and restored	2.6	5.2	1.0E-05
I can forget everyday worries	2.6	4.7	0.0006
My thoughts are clear at the moment	2.5	5	6.E-07

The above statistical results indicated that participants of the experimental study obtained significantly higher restorative effects after spending time in nature compared to before going to nature.

According to the most significant p value and the highest mean score difference between the pre-stage and post-stage, the strongest statement of the ROS was identified as “I feel relaxed and restored”. Figure 2.5. illustrated the participants response patterns to the statement.

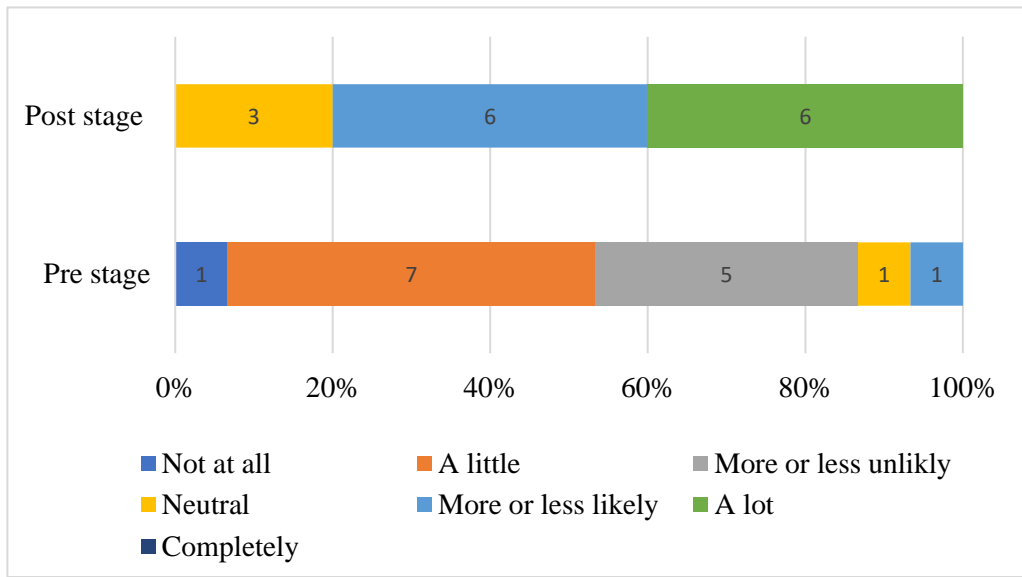


Figure 2.5. Participants’ respond pattern to the “I feel relaxed and restored” (Pre-stage and post-stage)

The above figure clearly shows that the post-stage response to the “I feel relaxed and restored” statement was highly positive. In the post-stage of the experimental study, all the participants were obtained that neutral, more or less likely or a lot relaxed and restored feelings. Moreover, “My thoughts are clear at the moment” statement was identified as the second strongest statement in the ROS. “I can forget everyday worries”, “I feel calm”, “I am focused and alert”, and “I have enthusiasm and energy for my everyday routines” statements were respectively showed the positive effects on participants in the post-stage response for the ROS. The overall results from ROS confirmed that the response to the spending time in nature was positive, and the participants observed significantly greater restorative benefits after spending time in nature.

Tendencies observed in the ROS were similar to the SVS results. The results indicated that a greater vitality level on participants in post-stage response to the SVS. Paired t-test was applied to compare pre-stage and post-stage responses to each statement. The results confirmed that each question of the SVS was statistically significant ($p < 0.05$). Table 2.3 showed the statistical differences between pre-stage and post-stage ROS statements.

Table 2.4. Statistical results of SVS (Pre-stage and post-stage)

Statements	Mean response(pre stage)	Mean response(post stage)	P value
I feel alive and vital	2.8	4.9	7.E-05
I do not feel very energetic	5.13	3	0.00052
I have energy and spirit	3.53	5.13	0.00079
I look forward to each new day	3.4	5.2	0.00017

The p values and the mean score differences in pre-stage and post-stage of the first, third and fourth questions in SVS indicated participants observed greater vitality level after spending time in nature. The second statement was negative and scored inversely. The p-values and mean score differences showed that the negative statement was also statistically significant and positively affected participants. Figure 2.6 shows the participants' response pattern to the negative statement in SVS.

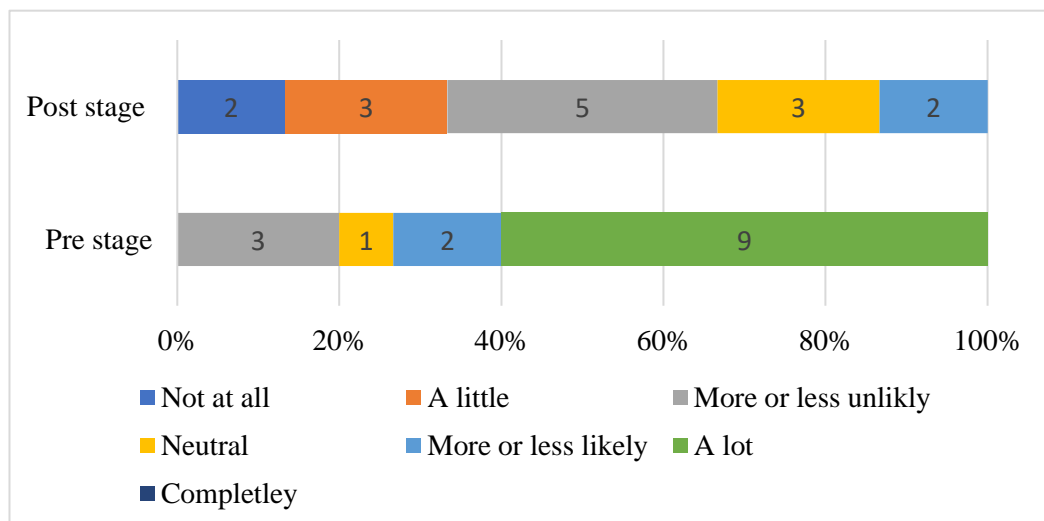


Figure 2.6: Participants' respond pattern to the negative statement "I don't feel very energetic" on SVS (Pre and post stage)

The above figure reflected that participants’ pre-stage response to the “I don’t feel very energetic” was negative. Nine participants responded as a lot, two were more or less likely, one was neutral, and three were responded as more or less unlikely. Since this statement is negatively inversed, post-stage responses reflected the positive response to the statement. This result indicated that participants felt more energetic after spending time in nature than before going to nature.

According to the statistical differences, four statements in SVS were listed from the highest to the lowest score receptively; “I feel live and vital”, “I do not feel very energetic”, “I have energy and spirit”, and “I look forward to each new day”. Figure 2.7 shows both pre-stage and post-stage participants response pattern to the strongest statement, “I feel alive and vital” in SVS.

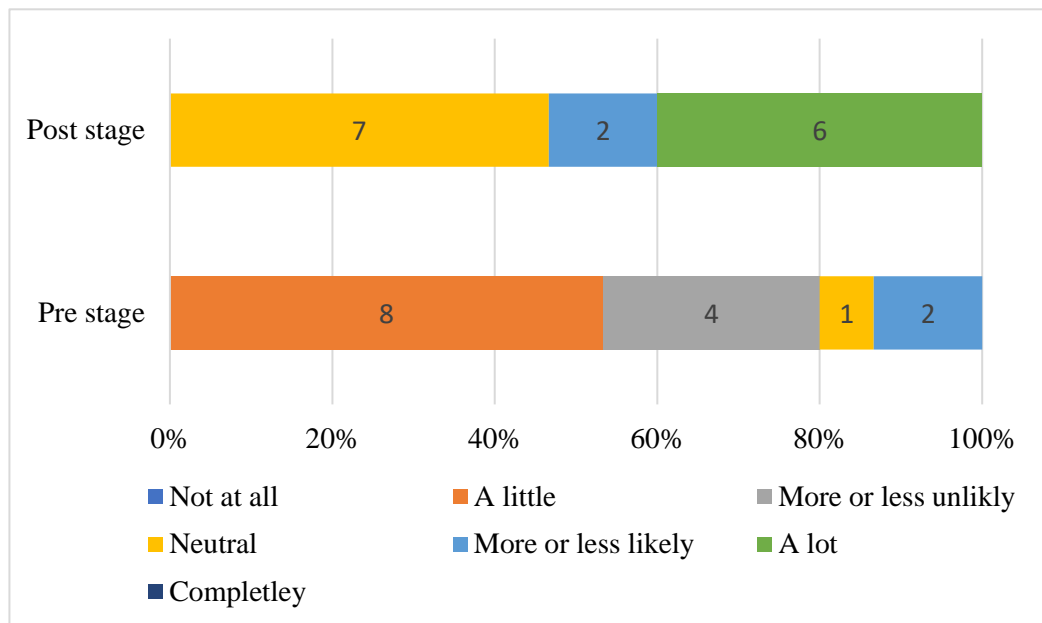


Figure 2.7: Participants’ before and after response pattern to the statement “ I feel alive and vital” in SVS

As the strongest statement of the SVS, for the “I feel alive and vital” all the participants’ responses were neutral, more or less likely, and a lot. These responses reflected that all the participants were increased alive feelings and increased vitality effects after spending time in nature.

To sum up the statistical results from the experimental study, physiological measurements between pre-stage and post stage were statistically significant. Both psychological scales; ROS and SVS responses were statistically significant. These results indicated that spending time in nature positively affects lowering heart rate and blood pressure level and increases the restoration effects and vitality level in humans.

2.2.2. Qualitative findings from the semi structured interviews

The semi-structured interview findings are categorized into four main themes: Psychological benefits, Nature recreational habits, Urban nature preferences, and Nature disconnection factors.

The first theme (psychological benefits) explained under four sub-themes: stress, attention, mood, and positive emotions. Findings revealed that none of the study participants has psychological medication history in their life. Although, all the study participants mentioned that they are dealing with daily life stress in different situations. Mainly mentioned stressful situations among the participants were over working hours and workload, exams and academic workload, family and relationship problems, and financial problems. Twelve participants (P1, P2, P3, P4, P7, P8, P9, P10, P11, P12, P13, P15) reported that nature helps them to cope with above mentioned daily life stressful situations. Across the experience of busy urban lifestyle, participants were mentioned words and ideas such as calm, refresh, peaceful and relief to describe how nature help to cope with the daily life stress. To give more evidence, P4 stated:

I easily get stressed and nervous over situations that I cannot control. But I noticed one thing, while I am in nature I feel much calmer, and I can forget all my worries and be free from the stressful situations. Nature is like a therapist for me.

Moreover, most participants expressed that city living adds extra stress to daily life and ability to access urban nature places within the city limit provide greater help as de-stressors. P1 stated:

Ever since I spend my childhood mostly in nature, I still adore tall trees, bird songs and cool breeze, which make me peace of mind. After I moved to the city, my living tempo has changed, and I often experience stress. Anyway, I make sure expose to nature daily. Near my working place, there is a park which I usually go there and

enjoy my lunch while watching nature. That kind of nature places are helpful for people like us to regain energy due to the busy city environment.

Only three participants (P5, P6, P14) mentioned that nature could not help for some stressful situations in their lives. The participants highlighted that they have some other vital ways to cope with stress. Further, some of them expressed that going to nature can lead them into another stressful situation. Although the participants responses established the idea that even the nature does not help them cope with stress, they enjoy nature eventually. The participants who brought that point to the discussion were living in greater urban areas. P14 expressed:

I usually listen to music or try to have a nap when I get stressed. Going to nature is not my cup of tea. But that does not mean I don't like to go to nature; I go to nature whenever I have free time and a free mindset. Then I can enjoy nature very much.

Through a follow up question, it is confirmed that none of the participant have anxiety or depression condition. By analyzing all the participants responses to stress and nature related questions, it is confirmed that nature help urban young adults to cope daily life stress.

The majority of the participants discussed that viewing nature help them to increase the attention level. Areas with water streams, water reactions in urban parks, urban parks with tree canopies, bluish clear sky, forest, or flower smells were mentioned as the most effective attention restoration elements in nature. It is clear that through the participants' responses, while urban living leads to overacting human minds and bodies, viewing nature provides refreshing minds with new tasks. P3 stated:

While I am walking through the city area, I always make a stop near to Baltijaam water area. This place makes me so soothing and regain my attention. I get refresh while looking at the water, and then I can focus more on my studies easily.

Moreover, interview responses reflected that viewing nature can improve mood and positive emotions. Ten participants were stated that they can noted the mood changes in nature. The busy lifestyle leads to constantly change the mood. Viewing nature through an office window, keeping indoor plants, walking to work through a nature area are

discussed among the participants as their mood improvement habits related to nature. P9 stated:

To keep the good mood throughout the day, I try my best to go for a walk early morning. I feel that it helps me a lot to keep the positivity throughout the day. nature helps a lot. expose to a cool breeze or warmth of the sunlight, hearing the morning bird songs make me feel refresh and those things can reverse my cranky mood into a cheerful direction.

Most of the participants mentioned that spending time in nature improves overall life satisfaction. They especially mentioned that, while forgetting daily worries, they can enjoy being in the moment, and feel positive, creative, and thankful for the life they live. Moreover, P12 stated that while exposure to nature enhance overall life satisfaction, creative ideas and new ideas also often arise and it helps to improve life.

Whenever I go to the nature as my mind forget all the worries, I try to reflect that the ways I can improve my life. It is amazing that I get more ideas to improve things in my life specially my business. And I feel that I am fulfilled with this life when stay longer in the woods.

Overall, semi-structured interview findings indicated that exposure to nature has numerous psychological benefits. Nature can support stress relief, attention and focus improvement, positive mood changes, creativity enhancement and improve overall life satisfaction.

Second theme discusses most satisfying nature elements and most beneficial green spaces among the participants. As nature offers many soft fascinations such as cloud floating, wind sound, forest smell, water dropping sounds, bird songs through nature elements, the researcher was curious to learn what kind of nature elements help to satisfy participants' nature experience. According to the participants nature experiences. they expressed that trees, flowers, breeze, water, forests, snow, bird chirping, beach, sky, sunrays, forest smells, grasses, sea waves and wild edibles as fascinating nature elements. Figure 2.8. illustrated the mostly satisfying nature elements among the study participants.



Figure 2.8. Most satisfying nature elements

Streets with more tree density can calm down the busy urban atmosphere. Further, participants expressed that, living in a residential area with more street tree density help busy adults to expose to nature effortlessly while engaging their daily tasks such as dog walking, going for groceries or work. Moreover, some of the participants mentioned that they like the way trees bearing all the seasons, and it is an excellent example to face the different situations and periods of life as humans. The above figure shows many participants mentioned that water and breeze as their favorite nature elements. Further, their explanations reflected that listen to the water and breeze brings them peace and more like a meditation. Some of the participants were mostly like to see spring flowers and especially mentioned that as they live in a northern country with the different season, they are eagerly waiting for the spring season to see the flowers. Several participants mentioned that they enjoy snow and, even if they are adults with busy lifestyles, somehow make time to go out and play with snow or spend time for snow sports such as skiing or snowboarding every winter.

Participants were asked to mention their favorite and most beneficial green spaces to spend time in nature within the city limit. According to the responses, seven participants (P1, P3, P4, P7, P10, P12, P13) mentioned urban parks are great to spend time and satisfy nature need while they have easy accessibility. Five participants (P5, P6, P9, P11, P15)

mentioned that street trees in their residential areas are favorite other than the urban parks. Their responses highlighted that streets with high tree density could satisfy their nature need while walking to work or grocery store without purposefully going to nature. Three participants (P2, P8, P14) were stated that they like outdoor exercise areas. Their responses explained why they choose outdoor exercise areas because fresh air and peaceful surroundings are better than indoor gyms or home exercises.

The third theme considers nature recreational habits among the study participants. The interview results made clear that urban young adults who participated to the study were relatively less incorporate with nature recreational habits such as visiting green spaces, exercising in outdoor parks, walking, cycling, or viewing nature around residential areas. Six participants (P4, P5, P9, P10, P13, P15) from the study expressed that they spend time in nature very rarely. P4 talked about her limited free time, and her busy lifestyle made less incorporate with nature.

I visit nature places around Tallinn very rarely. Since I have a much busier lifestyle, I rarely get free time. Even if I get a free time, I feel like it is an extra effort to dress up and go to nature. Instead of that, I prefer to use this limited free time to sit and rest or have a nap.

Five participants (P2, P7, P8, P12, P14) from the study group stated that they visit nature two or three times a week. Some of them specially stated that even if they have extremely busy lifestyle, finding time for nature is an important thing in their routine. P8 stated:

I usually go to the nearby nature park or to the beach two or three times a week. It is a much-needed escape from my stressful office work. Some time I have to struggle a lot to make time for nature but somehow I manage to do that every week.

Three participants (P6, P11, P3) stated that they only go to nature at least two or three times a month. These participants confirmed that even if they have free time, they are not concerned about nature recreational experiences. Their priority is given to indoor activities or social activities to spend free time. For example, P6 stated:

I actually go to the nature once in a while, two times or less per month. If I get a free time I always arrange meet up with friends or family. Going to a restaurant or a cafe or a movie with them are my priorities other than going to nature places such as park

or beach. Or even go to the gym or indoor waterpark with friends also how I spend my free time

Only one participant (P1) stated that she incorporates with nature every day. Her statement shows that her residential area is surrounded by many street trees and fewer concrete buildings. Among her active outdoor recreational habits, she highlighted that daily nature walks at least 15 minutes and two or three times a week park visit bring her energy to face everyday tasks from the workplace and studies.

Considering the fact of childhood living area, all the participants who expressed that they visit nature rarely were living in either greater urban or semi-urban areas in their childhood. Those who expressed two- or three-times nature visits a week lived in rural areas in their childhood. These responses confirmed that childhood living area and childhood nature experiences affect their young urban lifestyle. The participant who visits nature daily and those who expressed that they visit nature one or two times a month were living in either rural, semi-urban or greater urban areas. There is no significant pattern of their childhood living affecting the outdoor recreational habits.

According to majority of the participants of the study, the findings suggested that urban young adults are willing to go to nature despite the facts of seasonality. They mentioned that all year around there is something new to experience in nature. P9 stated:

Even though my job and studies limit my time for nature, I do not mind the season. I adore all for seasons, especially winter. If the time permits, I am ready to go and explore nature in all the seasons.

Moreover, the participants confirmed that in any season when they spend time in nature they feel relaxed and get the opportunity to have rest from daily life routine.

The fourth theme dedicated to reveal the disconnecting factors from nature. According to the participants responses, study results highlighted three main factors that are causing to disconnecting urban young adults from nature. That are, tough daily routine with work or study, digital device usage and addiction and weather changes. Figure 2.9 illustrated the participants' responses distribution among three main factors.

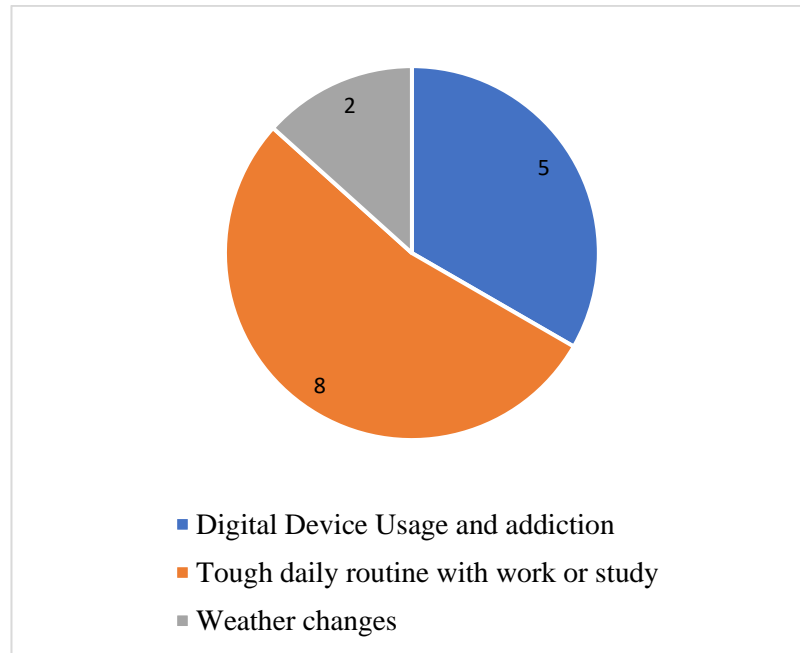


Figure 2.9. Nature disconnection factors among urban young adults

The main reason for growing disconnection from nature was their tough daily routine with work or study. P1, P4, P5, P9, P10, P11, P13 and P15 were evident for this reason, and their statements clarified the situation more precisely. P5 stated that:

My daily routine is very tough as a full-time student and full-time employee at the same time. On usual weekdays I start my online lectures at 10 am and finish around 3 pm. Then I start working at 7 pm and finish at 3 am. The only relief is that both study and work I can do from home. It really helps me save travelling time. I only have six hours or less to sleep every day. Usually, weekends are my free days from both work and study. These two days, I have to dedicate to managing the rest of my life, such as cleaning, laundry, groceries, and many other things. If I find enough time for leisure, I would rather choose to watch a movie or read a book. Most of the time, going to nature become less prioritize unintentionally.

Some participants who noted that their tough daily life routine cause to disconnecting from nature, also expressed that after a tiring work or study day, they would rather choose to relax at home and always postpone going to nature. Despite the fact that P1 stated that generally, work and study routine is her main problem that limits nature, she still manages to find several minutes daily to visit nature.

My daily life is indeed busy with a half time working contract and full-time studies. Although I still find few minutes to expose to nature every day. Some days, it can be straightly after work. But I can refresh in nature even if it is a rough workday. I can say that my busy life limits the time frame I spend in nature every day.

Findings revealed that second most affected reason for growing disconnection from nature is digital device usage and addiction. Five participants (P2, P7, P12,P8, P14) confirmed that their reason for disconnecting from nature is digital device usage and addiction to social media or other communication platforms. To give more evidence, P7stated:

Since my job is related to the IT industry, I digital devices. And then I usually manage my small business handing whenever I get free from work. So, with these two top priorities, I almost have to use the computer. Now I have an addiction to the mobile phone. At the same time, I am walking in nature or travelling, I usually use earplugs and listen to music which makes me disconnect from nature and even from the exact moment.

In line with the digital device usage and addiction, the findings highlighted that many urban young adults less prioritize visiting nature than they spend time on digital devices.

Only two participants (P3, P6) stated that weather changes could be another reason for disconnecting from nature. Especially they skip rainy and windy days, and winter is not comfortable for them to go to nature as they mentioned. Despite these two participants, some of the participants who mentioned the tough daily schedule or digital device usage limit their time for nature, do not consider the weather situation as Estonian weather is constantly changing. Those participants noted that snowing, cold, or windy days also consider as preferred days for nature.

The interviews revealed how urban young adults' lives have changed with the prevailing pandemic situation and the support from nature to cope with pandemic stress. According to the eleven study participants (P1, P3, P4, P6, P7, P8, P9, P10, P11, P13, P14), the pandemic is a difficult period. Nature's support to manage isolation, work from home, less social contacts is priceless. P6 elaborated on her experience in nature during the pandemic:

This time is a very difficult time for me. Working from home, without seeing my family abroad for months, no face-to-face contact with friends, masks on all the time anywhere you go, those things make me depressed now. But going to the nearby park even alone gives me such relief. Listen to nature's sounds and feel the breeze refresh me every time I go to nature. Even when I am looking at nature from the window can make thoughts positive to face this pandemic. Above statement and the majority of the participants' responses suggested nature is a great source to cope with the prevailing pandemic situation.

The rest of the four participants (P2, P5, P15, P12) of the study stated that they could not find any link between the pandemic and nature. Their opinion is pandemic makes their lives easier since all the things happen online, saving time and comfort at home.

The overall interview findings suggested that the urban nature supports the improvement of psychological wellbeing such as stress relief, attention restoration, mood improvement, increase positive emotions and enhancement of overall life satisfaction. The nature elements such as trees, forests, flowers, sky, water have been identified most fascinating and impactful nature elements and urban parks, street trees and outdoor exercise places are the commonly mentioned psychological wellbeing supported urban spaces. Tough daily routine and digital device usage lead urban young adults to growing disconnection from nature. Moreover, study confirms that nature helps urban young adults to cope positively with the pandemic situation. Overall findings confirmed that spending time in nature incorporate with positive health and wellbeing benefits.

2.3. Discussion and recommendations

This chapter presents the synthesis of findings from the present study and the literature review. The discussion provides a clear sense of what the author has revealed and repeats it with the literature review. The significant findings of the current study confirmed that exposure to nature improves health and wellbeing in urban young adults. Since the city environment provides many stressors, easily accessible urban green spaces are a great asset for urban dwellers to increase nature-based recreational habits and avoid disconnecting from nature.

In this study, physiological indications compared between before and after exposure to nature were similar to previous studies. The heart rate measurements showed significantly indications after the 15 minutes' walk followed by 15 minutes viewing session in nature. The previous studies (Song et al., 2015b, p. 2692; Ochiai et al., 2015a, p. 15228) have confirmed similar results after walking in an urban park /urban forest. Park et al. (2007, p. 24) explained that viewing a nature landscape decreases the heart rate and helps to reduce the stress level. Further, the present study revealed that exposure to nature reduces both systolic and diastolic blood pressure. This finding aligned with the previous study by Lee & Lee (2014, p.9) and showed that both systolic and diastolic blood pressure decreased after the forest walk. Shannan et al. (2016, p. 1) confirmed that frequent visits to outdoor green spaces could reduce blood pressure, and it helps to overcome high blood pressure health issues in city dwellers. Similarly, Mao et al. (2012, p. 500) confirmed that a short forest bathing session could decrease blood pressure and have positive effects on high blood pressure in the elderly. From the physiological indications from this study and the literature, it is confirmed that nature improves physical health and lower heart rate and blood pressure that directly affects psychological health and wellbeing.

Several positive psychological improvements were indicated from the results of this study. The study confirmed that spending time in nature helps increase restorative effects on urban young adults. Scores for the ROS were significantly higher after the 15 minutes walking and 15 minutes viewing session in nature. The mean scores for all the statements in ROS were higher after spending time in nature compared to before going to nature. ROS indications obtained from the current study repeated previous studies results in

which researchers used a similar approach to test participants restorative effects in urban parks/ forests environments (Bielinis et al., 2021; Ojala et al., 2019; Bielinis et al., 2018; Takyama et al. 2014). Further, the studies conducted by Bielinis et al. (2021) and Bielinis et al. (2018) confirmed that even in the winter season, short forest visits increase restorative effects on human. The present study was carried out at the beginning of the spring season, and many studies confirmed that natural environments enhance the restorative effects despite the seasonality. A short period of exposure to nature showed a significant increase in subjective vitality level. All the four statements in SVS were statistically significant and showed increased vitality level compared to before going to nature. The SVS results also aligned with the previous studies mentioned to synthesis ROS results.

The present study findings in terms of stress reduction suggested that urban green spaces support young adult to cope with daily life stress. Further, findings reflected that calmer, relieved, refreshing, and peaceful feelings have identified among the study participants, and these positively affected feelings help relieve daily life stress on urban young adults. These findings have matched the explanation of Stress Reduction Theory (SRT) founded by Ulrich (1986, pp. 29–44). SRT argued that viewing or exposure to a natural environment creates positive responses that support stress reduction. Those positive responses cannot be obtained by exposure to the artificial environment. Comparably, several other studies from the literature confirmed that visiting urban parks, other green spaces, forest, or residential green spaces support reduced stress level. (Repke et al., 2018, p. 13; Grazuleviciene et al., 2016, p. 7; Song et al., 2015, p. 2693; Ochiai et al., 2015a, p. 15266; Hartig et al., 2003, p. 116)

Based on Kaplan & Kaplan's Attention Restoration Theory (ART), exposure to the natural environment or viewing nature through a home window support better concentration and attention. Soft fascinations of the natural environment create effortless attention (Kaplan & Kaplan, 1989, p. 195). Young adults' responses from the current study proved the ART, that nature visits increase attention and concentration, and participants mentioned that natural elements such as water, blue sky, and trees (soft fascination) help gain attention and focus when exposed to nature.

Urban young adults highlighted that keeping a positive mood is important to maintain a productive and peaceful day. According to the study participants responses, it is confirmed that spending time in nature links with positive mood improvement. Previous studies (Simkin et al., 2020, p. 9; Bielinis et al., 2018, p. 282; Takayama et al., 2014, p.7226) also confirmed that short visits to nature could significantly improve moods.

Moreover, mentioned literature confirmed that exposure to nature could enhance self-esteem while positively affecting mood state (Barton & Pretty, 2010, p. 3949). The present study has not revealed anything related to spending time in nature link with self-esteem improvements.

Urban living can weaken city dwellers' energy due to exposures to urban stressors. Therefore, the life satisfaction among urban dwellers is comparatively lower than those who live in rural areas. Previous studies highlighted that connecting to nature increases happiness, meaningful and worthwhile feelings about life and overall life satisfaction. The present study also revealed that nature supports urban young adults to increase life satisfaction and fulfilled feeling. Further, the study revealed a new finding that exposure to nature increases creativity.

While the above synthesized study findings and literature providing health and wellbeing benefits of spending time in nature, further this study established several facts about nature interests and nature habits among urban young adults. Results revealed trees as the most fascinated and most beneficial nature element among urban young adults. Especially trees in urban streets or residential streets add aesthetic value to the environment and help urban dwellers to effortless exposure to nature while moving around their daily life tasks such as walking to the grocery or walking with pets. Even though the past studies have not established the most fascinated and beneficial nature elements, Concept of Nature Therapy and Attention Restoration Theory have discussed trees as a beneficial nature element and a soft fascination source for physiological and psychological wellbeing improvement (Kaplan & Kaplan, 1989, p. 195; Miyazaki et al., 2016). Additionally, the literature review has established that people who live in residential areas with higher tree density reported better overall health compared to people who live in residential areas with lower tree density (Karden et al., 2015, p. 9).

Moreover, study suggested that urban parks are one of the most beneficial green spaces in urban environment and somewhat support to satisfy nature needs of urban dwellers. Further, urban green spaces support urban dwellers to keep the balance of urban life and improve their psychological and physiological health affected from urban living. According to the present study results, streets with trees and outdoor exercise areas are also mentioned as essential urban green spaces to enhance health and wellbeing in urban dwellers. From the literature, numerous studies provide validations that urban park environment provides restoration and relaxing benefits and support to satisfy urban dwellers nature needs (Simkin et al, 2020, p. 9; Ojala et al., 2019, p. 67 ; Song et al., 2015a, p. 14224; Abraham et al, 2009, p. 164). The benefits of street trees in residential areas have been discussed above (Karden et al., 2015, p. 9) and advantages of outdoor exercise areas have proved through a green exercise study and confirmed that daily exercise in nature can reduce anxiety in a significant way (Mackay & Neill, 2010, p. 243). Combining the literature and present study indications, it can be confirmed that urban green spaces are help urban dwellers distract from urban stressors.

Most urban young adults compete to succeed in carrier, education or achieve financial goals. While facing a hectic lifestyle, they have limited leisure time to relax or occupy recreational activities. The present study revealed that urban young adults very rarely expose to nature. Further explanation to the results shows that urban young adults have some other strong leisure activities other than exposure to nature or engage with nature recreational activities. The results indicated that there is a growing disconnection from nature among urban young adults. Through this study, the researcher sought what causes urban young adults to disconnect from nature. The study established three significant nature disconnecting factors among urban young adults. Challenging daily routine with work or study has identified as the main factor for limiting urban young adults' time to spending time in nature. Digital device usage and additions are the second main fact, and extreme weather conditions were also mentioned as a minor fact for disconnecting from nature. Previous literature supported to establish the main factor of growing disconnection from nature, study conducted by Melchior et al. confirmed that urban young adults are often depressed by excessive workload and extreme time pressure from their jobs (2007, p. 1129). Further, the literature highlighted that urban young adults, both males and females, spend less time for physical activities in nature or indoors and spend more time

on sedentary behaviors such as addiction to mobile devices, video games and watching television (Machado-Rodrigues et al., 2012, p. 123, Thomee et al., 2007, p. 1312). Several previous studies have shown that nature offers restorative benefits even in extreme weather conditions such as heavy winters in northern countries. Although, one study highlighted that Finnish people showed fewer vitality effects after exposure to forest environment in extreme winter. Further, the study explained, people in northern countries see the winters as a difficult period. This situation may be similar to Estonian young adults.

In the study period, the world going through a COVID-19 pandemic. Especially urban young adults are depressed with the situation that causes them to change their social lifestyle. Maintaining social distancing, working from home and away from friends and family for a long period, leads them to excessive stress. The present study revealed that exposure to urban green spaces help urban young adults to cope with the stress caused by the prevailing pandemic situation.

The above discussion synthesized the study findings and the literature review. Most of the study findings were similar to the findings from previous studies, and several new findings were also revealed. To conclude, the exposure to nature offer numerous health and wellbeing effects and the urban green spaces such as urban parks, street trees and outdoor exercise places are a great source to enhance nature recreational habits among urban young adults. Simultaneously, the identified nature disconnecting factors reflected the lifestyle and choices of urban young adults, leading to understanding how they can improve their lifestyle to enhance health and wellbeing while reconnecting to nature through urban green spaces. This conclusion led to the following recommendation, and it may support urban young adults to improve health and wellbeing and overall lifestyle.

The young adults who grew up in urban areas may not have experienced nature and are not aware of its health and wellbeing benefits. They constant exposers to urban stressors has already weaken their health and wellbeing. The findings from this study confirmed health and wellbeing benefits of exposure to nature /urban green space, that provide recommendations for urban young adults to consider exposers to easily accessible urban green spaces and improve physiological and psychological health and wellbeing.

The study highlighted urban green spaces such as urban parks, streets with trees, and outdoor exercise areas as excellent sources to satisfy the nature needs of urban young adults. They can take advantages of those places by establishing nature recreational habits such as walking, cycling, exercising or just relaxing in nature instead of limiting their leisure time to indoor activities. Further, they can include nature contact in their daily life to break sedentary behaviors, leading to adverse physical and mental health. Through this study findings, the researcher recommends urban young adults to expose urban green spaces effortlessly through their daily life activities such as walking to the grocery instead of driving, going to the outdoor exercise areas instead of indoor exercising, or creating their daily routing including nature contact. This type of effortless activities enhances the overall lifestyle of urban young adults.

While city living leads to numerous health and wellbeing problems, this study recommends that urban young adults should prioritize health as the most important factor to maintain a satisfying life. Urban young adults should concern the nature disconnection as a serious matter. They could adjust the lifestyle by reconnecting to nature to improve the wellbeing and reduce the adverse outcome from urban living.

To sum up, exposure to nature offers numerous health and wellbeing benefits for urban young adults. Urban green spaces such as urban parks, forests, streets with higher tree density are a great source to establish nature contact and improve their lifestyle. Further, by taking the initiative to break the growing disconnection from nature, urban young adults can improve their overall lifestyle while reconnecting to nature. Moreover, the present study has given urban policymakers and urban planners insight to establish more green spaces within the cities by providing effortless nature connection through green spaces to create healthy and mentally fulfilled city dwellers.

CONCLUSION

In human history, most people lived in small communities with a closer relationship to natural environments. Over the past several decades, human connection with nature has drastically declined. Many people from rural areas are shifting to urban areas to enhance life quality. However, urbanization has become one of the major threats to human health and wellbeing in the 21st century. By exposing to urban pollutants and urban life stressors, people become physically and mentally unwell and weaken. This problem is often highlighted among urban young adults as their health conditions and efficiencies affect society and economic development. To reduce the risk of physical and psychological health among the city dwellers, most of the major cities in the world offer numerous solutions and establishing easily accessible urban green space is one of the successful and sustained solutions. As this solution directly addresses the problem, growing disconnection from nature could be considerably reduced by educating urban young adults about the health and wellbeing benefits of exposure to nature. Further, urban green spaces can be recommended as a great source to satisfy their nature needs.

The goal of the thesis was to analyze the health and wellbeing effects of exposure to nature, identify the causes for growing disconnection from nature among urban young adults and then provide recommendations to improve their health and wellbeing and overall lifestyle by reconnecting to nature. To achieve the thesis goal, the researcher formed two research questions directly supporting the research goal. Then, the theoretical literature review embarked on the topics of health and wellbeing effects of spending time in nature, nature therapy history and other nature connection activities, the relationship between urban greenspaces and human health, and the negative impacts of urban living on young adults. The literature review provided immense support to the design of the empirical study.

The empirical study was carried out in Tallinn, Estonia using 15 study participants. The primary data collection methods were experimental field studies and semi structured interviews. The experimental study collected participants physiological data and several psychological indications in pre-stage and post-stage. Further, semi-structured interviews revealed primary data of nature recreational habits, nature disconnection factors and several psychological effects of exposure to nature.

The study's main finding indicated that exposure to nature offers numerous health and wellbeing improvements on urban young adults. As physiological benefits, spending time in nature can lower heart rate and lower blood pressure. These physiological indications are directly linked with the psychological benefits obtained from spending time in nature. The identified psychological health benefits are restoration effects and vitality level increment, stress relief, improved attention and focus, mood improvement, overall life satisfaction, and creativity enhancement. Further, the study findings suggested that urban green spaces are a great source to enhance nature recreational habits among urban young adults. Further, the study results highlighted that urban green spaces in cities could play a vital role to avoid growing disconnection from nature among urban young adults.

During the synthesis of the study results and literature review, the author confirmed that most of the study findings were similar to previous studies, and several findings were revealed as new knowledge. Since this study confirmed the health and wellbeing effects of exposure to nature, indications below clearly provide recommendations for urban young adults.

1. To consider exposure to nature to improve their physical and psychological health and wellbeing.
2. To initiate nature recreational habits (walking, cycling, mindfulness practices, and exercising) based on urban green spaces.
3. To pay attention to reasons of disconnecting from nature
4. Suggestion for urban policymakers and authorities to establish more green spaces within cities to enhance the city dwellers physical and psychological health and wellbeing.

As every empirical study, this study also had several limitations. The research sample was smaller than planned before, and it was limited only to female participants. The sample limitations happened due to the pandemic situation and its restrictions and, the limited time frame for the study completion. A big sample consisting of an equal mix of both male and female participants would have given enough data to make generalization to the whole research population. Further, in this study the researcher measured only health data of the experimental participants, but the study site's environmental condition such as temperature, humidity, air quality and sound level were not measured. There are some unexplored areas in this study, as examples seasonality effects on health and wellbeing, and longer stay in the nature and its effects that should be addressed on future studies.

To conclude, the researcher believes the current study's theoretical and empirical integrations provide insights for urban young adults to improve their health and wellbeing by reconnecting to urban green spaces. Further, the study provides support to reduce the impact of growing disconnection from nature among urban young adults by educating them about the health and wellbeing effects and introducing urban greenspaces as a place to satisfy their nature needs.

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Appendices

Appendix 1. Restorative Outcome Scale (ROS)

Participant :..... Date Time

(Before/After)

	items	Not at all	A little	More or less Unlikely	Neutral	More or less Likely	A lot	Completely
1.	I feel calm	1	2	3	4	5	6	7
2.	I am focused and alert	1	2	3	4	5	6	7
3.	I have enthusiasm and energy for my everyday routines	1	2	3	4	5	6	7
4.	I feel relaxed and restored	1	2	3	4	5	6	7
5.	I can forget everyday worries	1	2	3	4	5	6	7
6.	My thoughts are clear at the moment	1	2	3	4	5	6	7

Appendix 2. Subjective Vitality Scale (SVS)

Participant Date Time

Before /After

No.	Items	Not at all	A little	More or less Unlikely	Neutral	More or less Likely	A lot	Completely
1.	I feel alive and vital	1	2	3	4	5	6	7
2.	I do not feel very energetic	1	2	3	4	5	6	7
3.	I have energy and spirit	1	2	3	4	5	6	7
4.	I look forward to each new day	1	2	3	4	5	6	7

Appendix 3. Questionnaire for semi-structured interviews

No.	Questions	Source
1.	What was the most remarkable nature experience in your life?	(Simkin et al., 2020, p. 4)
2.	Can you explain about your childhood Dwelling area?	(Simkin et al., 2020, p. 4)
3.	How is your physical health condition right now?	(Ojala et al., 2019, p. 63)
4.	What do you think about your mental health?	(Ojala et al., 2019, p. 63)
5.	How often do you visit natural green spaces in Tallinn city area?	(Ojala et al., 2019, p. 63)
6.	Can you further explain it according to the seasons (ex. How many times in winter /summer)	(Ojala et al., 2019, p. 63)
7.	Describe how stressful or mentally tiring your studies, job, or household work in general?	(Ojala et al., 2019, p. 63)
8.	Did you notice any differences in your stress level while you are in nature?	(Ojala et al., 2019, p. 63)
9.	What are the nature elements you appreciate very much ? and what kind of green spaces you like mostly?	(Brich et al., 2020, p. 5)
10.	Do you think urban green spaces such as urban parks, recreational nature areas near by the city are sufficient to satisfy your need for nature ?	(Ojala et al., 2019, p. 63)
11.	How do you feel about your mood right now, after spending time in nature?	(Ojala et al., 2019, p. 63)
12.	What are the factors that you are disconnecting from nature?	Author compiled
13.	Specially in this pandemic situation, how does nature help to you to cope with the pandemic stress ?	Author compiled

Appendix 4. Background information of the participants

Code	Age	Nationality	Employment/ study status	Physical health difficulties	Psychological health difficulties	Childhood Dwelling area
P1	29	Estonian	Half time employee +Full time student	No	No	Semi Urban
P2	30	Sri Lankan	Half time employee +Full time student	No	No	Rural
P3	30	Estonian	Full time employee	No	No	Semi Urban
P4	30	Sri Lankan	Half time employee +Full time student	No	No	Greater Urban
P5	28	Sri Lankan	Full time employee +Full time student	No	No	Greater Urban
P6	30	Sri Lankan	Freelancer +Full time student	No	No	Greater Urban
P7	24	Estonian	Half time employee +Full time student	No	No	Rural
P8	30	Estonian	Full time student	No	No	Rural
P9	25	Estonian	Full time employee +half time student	No	No	Semi Urban
P10	28	Estonian	Full time employee +half time student	No	No	Greater Urban
P11	29	Russian	Full time employee	No	No	Greater Urban
P12	26	Russian	Full time employee +Small business owner	No	No	Rural
P13	24	Sri Lankan	Half time employee+ Fulltime student	No	No	Greater Urban
P14	24	Estonian	Full time employee	No	No	Rural
P15	30	Estonian	Full time employee + full time student	No	No	Greater Urban

RESÜMEE

LOODUSES AJA VEETMISE KASUTEGURID LINNAS ELAVATE NOORTE TÄISKASVANUTE TERVISELE JA HEAOLULE

Saumya Rathnayake

Läbi ajaloo on inimese ja looduse vahel olnud tugev side, mis on aga mitme viimase aastakümne vältel drastiliselt nõrgenenud. Täna elab üle poole inimkonnast linnapiirkondades, et oma elukvaliteeti parandada. Ent 21. sajandil on linnastumisest saanud üks olulisi ohte inimeste tervisele ja heaolule. Seda probleemi tuuakse sageli esile just noorte täiskasvanute puhul, kuna nende hektilise elustiili sisse peab mahtuma korraga nii karjääri-, haridus- kui finantseesmärkide saavutamine. Linlik eluviis lõhub aina enam noorte täiskasvanute sidet loodusega. Kirjeldatud probleem inspireeris töö autorit uurima, kuidas mõjutab kokkupuude loodusega noorte täiskasvanute tervist ja heaolu ning mis põhjustab looduskontakti kaotamist. Lõputöö eesmärk on analüüsida loodusega kokkupuutumise mõju tervisele ja heaolule, tuua välja põhjused, miks linnade noored täiskasvanud üha enam loodusest kaugenevad ja anda soovitusi nende tervise ja heaolu ning eluviisi parandamiseks, kasutades sideme taastamist loodusega. Lõputöö kirjanduse ülevaade koosneb neljast alateemast. Alateemad on: looduses veedetud aja mõju tervisele ja heaolule, loodusteraapia ajalugu ja muud looduskontaktid tegevused, linna rohealade ja inimese tervise vahelised seosed ja linnas elamise negatiivsed mõjud noortele täiskasvanutele. Kirjanduse ülevaade toetas käesoleva töö empiirilise uuringu osa ettevalmistamist tohutul määral.

Empiiriline uuring on läbi viidud segametoodikat kasutades; autor kogus esmase materjali eksperimentaalse uuringu ja poolstruktureeritud intervjuude käigus. Uuring viidi läbi Eestis Tallinnas, kasutades valikrühmana 15 uuringus osalejat. Autor kogus eksperimentaaluuringu eelses ja järgses etapis kokku osalejate füsioloogilised terviseandmed (pulss ja vererõhk), samuti andmed mitmete psühholoogiliste aspektide

kohta (taastav toime ja vitaalsuse tase). Poolstruktureeritud intervjuude abil koguti andmeid linnas elavate noorte täiskasvanute loodusega seotud rekreatsiooniharjumuste, looduskontakti kadumise tegurite ja mitmete loodusega kokkupuutumise psühholoogiliste mõjude kohta (stress, tähelepanu, meeleolu, rahulolu eluga). Uuringu peamine järeldus näitas, et kokkupuude loodusega parandab linnade noorte täiskasvanute tervist ja heaolu mitmel moel. Füsioloogilisest aspektist võib looduses viibimine tuua tervisele kasu langetades pulssi ja alandades vererõhku. Ent need füsioloogilised näidustused on otseselt seotud looduses veedetud ajast sündiva psühholoogilise kasuga. Identifitseeritud psühholoogilised kasutegurid tervisele on taastav mõju ja suurem vitaalsus, stressi leevenemine, parem tähelepanu- ja keskendumisvõime, meeleolu paranemine, üldine rahulolu eluga ja loovuse kasv. Lisaks viitasid uuringutulemused sellele, et linna rohealad sobivad suurepäraselt linnas elavate noorte täiskasvanute looduspuhkuse harjumuste tekitamiseks. Lisaks selgus uuringutulemustest, et linnade rohealad võiksid mängida olulist rolli vältimaks noorte täiskasvanute üha kasvavat kaugenemist loodusest. Kuna käesolev uuring kinnitas loodusega kokkupuutumise mõju tervisele ja heaolule, soovib töö ka linnas elavatel noortel täiskasvanutel kaaluda kontakti loodusega, et parandada oma füüsilist ja vaimset heaolu. Veelgi enam, käesoleva töö autor soovib linnas elavatel noortel täiskasvanutel kujundada teadlikult välja oma vaba aja veetmise harjumused nagu kõndimine, jalgrattasõit, märkamisharjutused (*mindfulness*), sportimine linna rohealadel. Käsitledes looduskontakti katkemise tegureid tõsise küsimusena, pakub käeolev uuring noortele täiskasvanutele võimalust õppida ja pidada silmas loodusega kontakti taasleidmise tähtsust.

Kokkuvõtteks võib öelda, et autor usub, et käesoleva uuringu teoreetilised ja empiirilised seosed annavad linnade noortele täiskasvanutele ülevaate võimalustest parandada oma tervist ja heaolu linna rohealadel. Lisaks pakub uuring tuge linnast pärit noorte täiskasvanute kahaneva looduskontakti mõju vähendamiseks, harides neid tervise- ja healumõjude küsimuses ning tutvustades linna rohealaid kui paika looduskontakti-vajaduste rahuldamiseks. Peale selle pakub käesolev uuring linnakeskkonna poliitikakujundajatele ja linnaplaneerijatele ülevaate, kuidas rajada linnadesse rohkem rohealaid, pakkudes roheliste alade abil loomulikku kontakti loodusega, et aidata nii kaasa linlaste tervisele ja vaimsele heaolule.

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