

Physical and Psychological Health Benefits of Urban Park in Relation to Pandemic Crises

Amira Arisya Mohamad Nadzri¹, Mohd Ramzi Mohd Hussain^{2,*}, Izawati Tukiman³, Muhammad Al Amin Mahamad Zaini⁴, Nurfaradilla Roza Shazalee⁵

^{1,2,3,4,5}Department of Landscape Architecture, Kulliyah of Architecture and Environmental Design, International Islamic University Malaysia, 53100, Kuala Lumpur, Malaysia.

*Corresponding Author: ramzi@iium.edu.my

Copyright©2023 by authors, all rights reserved. Authors agree that this article remains permanently open access under the terms of the Creative Commons Attribution License 4.0 International License

Received: 10 April 2023; Revised: 15 May 2023; Accepted: 30 June 2023; Published: 15 August 2023

Abstract: Urban parks have many benefits and have been identified as a unique source of community resilience during prolonged pandemic quarantine. Pandemic-related issues, such as stay-at-home orders, lockdowns, and long-term quarantine, pose a threat to global public health. It has unquestionably devastating effects on human health. It is believed that secure, healthy, and supportive environments are necessary for humans' physical and psychological health. The research aims to investigate the role of urban parks as the mechanism for the physical and psychological health benefits of the pandemic crises. This paper reviews the significant contribution of urban parks to the physical and psychological health benefits. The literature demonstrates that the presence of a natural environment has substantial positive effects on an individual's physical and psychological health. It emphasized the role of urban parks in reducing stress and depression symptoms, promoting physiologically healthier individuals during an outbreak of a pandemic, enhancing the quality of life and life satisfaction, providing entertainment and relaxation, and fostering greater social interaction and cohesion. It is anticipated that this paper will become the foundational theory and comprehension of the role of urban parks in enhancing physical and psychological health during pandemic crises.

Keywords: *Urban Parks, Pandemic Crises, Physical Health, Psychological Health.*

1. Introduction

In recent years, numerous scientific research on urban parks has begun to emphasize the numerous benefits of parks. Prior to the global pandemic crises, the health-enhancing potential of urban parks was widely acknowledged [1,2]. During times of crisis, this potential becomes much more apparent. On all continents, public parks have been identified as a unique source of community resilience during lengthy pandemic lockdowns and quarantines [3-5]. The health consequences of the pandemic are more likely to affect urban citizens [6,7], and urban parks are susceptible to the risk of outbreak transmission and social isolation [8].

The World Health Organization emphasized that urban parks provide a variety of advantages that, through various

means, can have variable effects on the population's environmental health. Various epidemiological methodologies have been used to assess the impact of urban park availability and accessibility on the health outcomes of study participants. The Environmental Health Intelligence New Zealand defines environmental health as human health (including quality of life) that is affected by physical, chemical, biological, social, and psychological environmental variables. Preserving human health requires a safe, wholesome, and supportive environment, according to the definition. Our health and well-being are significantly influenced by environmental health. Morris [9] believes that urban parks, as part of a larger environmental context, are an effective method for addressing the challenges of addressing the negative health consequences.

Corresponding Author: Mohd Ramzi Mohd Hussain, Department of Landscape Architecture, Kulliyah of Architecture and Environmental Design, International Islamic University Malaysia, 53100, Kuala Lumpur, Malaysia. Email: ramzi@iium.edu.my

Pandemics are large-scale disease outbreaks that spread extensively due to human-to-human infection and can significantly increase morbidity and mortality over a vast geographical area [10,11]. This pandemic-related concern is a global public health issue. This impacts people's daily lives by limiting their access to physical activity in public spaces (such as parks) and social interaction with other residents. Consequently, global physical and psychological health is deteriorating. It is believed that urban public spaces, especially urban parks, can aid in reducing the high prevalence of illness and disease in many cities [12]. This objective of expansive preventative urban park initiatives will afford numerous opportunities to build communities with improved health outcomes for residents [12]. Given the potential for urban parks to serve as health promotion settings, especially during pandemic crises, it is crucial to determine the significance of urban parks during pandemic crises and how they can contribute to physical and psychological health outcomes.

Thus, this research aims to investigate the role of urban parks as the mechanism for the physical and psychological health benefits concerning the pandemic crises. In this regard, two objectives are hence formulated (i) to identify the beneficial role of urban parks in enhancing physical and psychological health during the pandemic crises, and (ii) to investigate the importance of urban parks during the pandemic crises to improve health.

2. Materials and Methods

This research employed content analysis to analyze the data collected from the literature review. A broad definition of a literature review is a more or less methodical method of compiling and synthesizing prior research [13]. A literature review may address unexplored research topics by incorporating the outcomes and perspectives of numerous empirical findings from previous research [13]. Several journal articles, papers, books, and websites were reviewed in this research based on the theory of urban parks and their benefits to physical and psychological health during pandemic crises. The literature is divided into three main theoretical ideas related to the research: urban parks, physical and psychological health, and pandemic crises.

3. Findings and Analysis

3.1. Understanding of Urban Park

3.1.1 Theory and Evolution of Urban Park

The theory of urban parks emerged during the Industrial Revolution of the nineteenth century when the movement's goal was to enhance the urban quality of life [14]. Urban parks have become an integral part of the urban fabric in order to create livable and sustainable cities [15]. It serves as an open space that provides numerous benefits to improve

the health, well-being, economy, and quality of life of people. Frederick Law Olmsted provided the most well-known definition of an urban park when he described it as a naturalized passive retreat [16]. Between the mid-nineteenth and early twentieth-centuries [16], Olmsted's term was extensively used throughout the world, particularly in the United States. During the early nineteenth-century Industrial Revolution in the Western world, the modern concept of the urban park emerged [15,17,18]. Planners recognized the significance of urban parks in enhancing the quality of urban life, which had deteriorated as a result of rapid industrialization, and urban parks ultimately arose as a place to alleviate the stresses of chaotic industrial cities [18].

Congested urban areas have significantly impaired the character of urban life as a result of the massive influx of people into the city [15]. Since then, urban planners have begun to view the urban park as an area that can contribute to the tranquility and comfort of city life by providing a retreat from pollution and tension [15]. Late in the nineteenth century, when social reform of working people in Britain laid the foundation for early legislation by establishing open spaces in cities and towns, urban parks were built at public expense [19]. Urban parks have transformed American and European cities since then.

As cities have become increasingly urbanized and industrialized, urban parks have become a significant asset [20]. Urban parks are quickly becoming one of the most important components of the city's fabric. The need for and demand for urban parks has increased as a result of significant population shifts brought on by the urbanization and industrialization of many cities [21-23]. The urban park is believed to provide numerous benefits to cities and their residents [21]. People would visit an urban park to relax, interact with others, and partake in recreational activities with their families and neighbors [20,24,25]. It evolved into significant urban locations that are valued and can enhance a city's appearance and quality of life. The interaction between humans and nature in urban parks has positive effects on both physical and psychological health. These advantages include a decrease in obesity, depression, and anxiety, as well as an increase in physical activity, spiritual engagement, and social connection. [26,27,28].

3.1.2. Definition of Urban Park

Urban park is, by definition, a valuable source of recreation for visitors and a destination for urban residents to decompress from the stresses and demands of city life [29]. Any designated public space in a city that offers opportunities for passive or active recreation is referred to as an urban park [30,31]. Another definition of an urban park is any urban area set aside for the public's aesthetic, recreational, cultural, and educational use [32]. The creation of urban parks for recreational purposes will significantly benefit urban residents by fostering public health, social well-being, and public enjoyment of the adjacent environment [33,34]. Moreover, an urban park is defined as a

public space in urban region that features eco-friendly areas for leisure activities and social life, a natural setting, an aesthetic purpose, education, and cultural heritage [35].

3.2. Urban Park as Important Public Space to Improve Physical and Psychological Health during Pandemic

3.2.1. Pandemic Throughout History

Since 1200 BC, there have been over 200 pandemics, and the historical pandemic agents most likely originated in large animal populations, allowing the agents to disseminate throughout those populations [36]. Some of these novel diseases spread swiftly within a region, causing epidemics, while others spread globally, affecting large numbers of people in numerous nations and continents [36]. These pandemics are unpredictable yet recurrent occurrences that can have far-reaching effects on societies worldwide [37]. It affects a broader population and is frequently caused by a recently emerged pathogen or disease. This disease increased human-animal interactions, resulting in the spread of infection. It increased travel to other locations, exposing individuals to more pathogens and viruses, which had a negative effect on their health. [38].

3.2.2 Territorial Impact of Pandemic

A pandemic has resulted in severe illness, high death rates, and social, political, and economic unrest [10,39-41]. Pandemics have a number of negative social, environmental, physical, and psychological consequences [42], in addition to severe and usually fatal consequences for the infected individuals. HIV, H1N1, H5N, and SARS are some infectious disease pandemics that could swiftly cross borders and threaten economic and regional stability [10]. Pandemics and emerging infectious disease epidemics have the potential to cause substantial mortality and morbidity, accounting for up to one-fourth of global deaths [43].

Since the majority of people have little to no immunity to infections, pandemic crises typically cause social unrest and a decline in public health as a whole. More than 20 million individuals perished worldwide during the 1918–1919 pandemic, which is regarded as the deadliest pandemic ever recorded [10]. This pandemic is causing illness and death, forcing billions of people into various forms of quarantine as healthcare systems struggle to keep up [44]. During protracted periods of pandemic isolation and quarantine, during which all green outdoor spaces, including parks, may be temporarily restricted, it is crucial to design, plan, and maintain parks so that they remain accessible and offer recreational opportunities to diverse populations [45].

3.2.3. Importance of Urban Park to Improve Health

Since the beginning of city planning, the value of metropolitan parks has been the subject of debate. Fredrick

Law Olmstead, the designer of the world-famous Central Park in New York City, popularized the notion that urban parks provide numerous health benefits to urban residents [19]. Urban planning that includes the planting of large, mature trees along city streets and in public parks offers a respite from the pollution, congestion, and sights of the city [46]. Greenbelts as encircled by Ebenezer Howard's Garden Cities in the 1980s and Corbusier's High Rises were interwoven with parks, allowing people to spend their leisure time in clean, light, and noise-free environments [47]. The need of urbanites for open recreation is a joy derived from the environment that does not require conscious effort [48]. Human and environmental urban park benefits include biodiversity benefit, health and welfare benefit, house price benefit, cooling benefit, air quality and carbon sequestration benefit, water management benefit, tourism benefit, and social integration benefit [48-50].

Urban parks have the potential to satisfy a vast array of human demands [51]. This includes the results of numerous studies demonstrating the positive effects of environment and greenery on people's health, which are known to reduce stress and mental disorders [52,53], increase the effectiveness of exercise and improve health outcomes [54], and improve the perception of life quality and self-reported overall fitness [55]. The secondary health effects are conveyed by providing opportunities for physical activity [56], enhancing the enjoyment of the living environment and social contacts [12,57], and providing a variety of leisure activities [58].

3.2.3.1. Urban Parks Enhanced Physical Activity

There is evidence that proximity to parks improves overall physical health [59–62]. Roger Ulrich discovered in the 1980s that solely gazing out the window at nature can have positive effects on one's health [62]. According to the research, patients in hospital beds with forest views recovered more quickly, required less pain medication, and had fewer post-surgical complications than those in city-view accommodations. Aside from that, individuals who spent more time in natural spaces had significantly reduced risks for a variety of chronic diseases [61]. Exposure to natural areas has been linked to a lower heart rate, lower blood pressure, lower cholesterol, and a reduced risk of stroke, asthma, diabetes, and coronary heart disease [61].

Living in areas with greater residential greenness was found to reduce the risk of cardiovascular mortality in another study [60]. In Florida, greater exposure to natural areas has also been associated with a reduced risk of failing from a stroke [63]. Another research [59] highlighted the importance of landscape diversity, including trees and open areas, in enhancing physical health outcomes. The results of the study suggest that a larger diversity of greenery in a neighborhood is associated with a lower risk of heart disease and stroke. Residents of urban areas with exceedingly variable levels of greenness were found to have a lower risk

of hospitalization and self-reported heart disease or stroke. Variation in the distribution of greenness is thought to contribute to improved health outcomes by encouraging physical activity [59].

There is evidence that urban parks enhance physical health in the United Kingdom, where more than 80 percent of the population lives in urban areas, and that open space within urban areas contributes sustainably to overall outdoor recreational opportunities [64]. According to a study conducted in Helsinki, Finland, nearly all (97%) city residents participate in outdoor recreation at least occasionally throughout the year [65]. Half the population engages in a daily or weekly outdoor excursion. The centrally located Chapultepec Park in Mexico City attracts up to three million visitors per week who engage in a variety of activities, according to a separate study [66]. On the evidence of both studies, it is demonstrated that living near a park in an urban setting enhances one's physical health, primarily by increasing one's level of physical activity [66]. This is because parks provide a setting for people to exercise, meander, and bike while observing nature and avoiding traffic. This increases the number of fitness options and makes them more pleasurable [66].

3.2.3.2 Urban Parks Improved Psychological Health

The presence of natural environments can significantly improve an individual's overall psychological health [67-69]. It can reduce the environmental and health hazards associated with urban living. The presence of parks and open spaces in urban areas contributes to psychological health and well-being by encouraging tension reduction and relaxation [27]. The benefits include enhanced cognitive, immunological, and physical performance, as well as a reduction in total mortality [51-53]. Another study found that exposure to nature can reduce stress [68]. In addition, other studies [52,56] have found that parks have a significant positive effect on mental health by improving mood in general, reducing depressive symptoms, enhancing cognitive functioning, focus, and short-term memory, and fostering creativity.

When people were surrounded by natural settings, their cortisol levels decreased rapidly, but they remained elevated when they were exposed to urban settings [27]. The same study found that hospital patients whose rooms overlooked a park recovered 10% more quickly and required 50% fewer potent analgesics than those whose rooms overlooked a building wall [27]. This is persuasive evidence that urban parks may improve the psychological health of city inhabitants. Another study conducted in Swedish municipalities found that the more time individuals spend outdoors in urban parks, the less anxious they are [70], while a decrease in contact with natural settings has been linked to an increase in psychiatric disorders [67]. The term nature deficiency disorder was coined in response to a growing body of research indicating that a life devoid of nature is detrimental [71].

These factors are consistent with the WHO's concept of health, which includes social, psychological, and physical aspects [72]. To promote and strengthen public health, it is believed that everyone, as well as local authorities and policymakers, must engage in a variety of health-promoting activities. Creating a healthy urban environment is a significant boon for this industry. Given the rising degree of global urbanization and the aforementioned benefits, urban parks are essential for maintaining and fostering the physical and psychological health of city dwellers.

4. Conclusion

In conclusion, this research outlines the roles and importance of urban parks in enhancing physical and psychological health during pandemic crises, which can be improved and employed in future research. The implementation of the recommendations and improvements may reveal other elements influencing people's preferences and usage of urban parks.

Acknowledgments

We would like to acknowledge the Malaysia Ministry of Higher Education (MHE) through the Research Management Center of the International Islamic University Malaysia for their research grant FRGS/1/2021/SKK06/UIAM/02/7.

References

- [1] C. Maller, M. Townsend, A. Pryor, P. Brown, L. St Leger, Healthy Nature Healthy People: 'Contact with Nature' as an Upstream Health Promotion Intervention for Populations, *Health Promotion International*, 21(1), 45-54, 2006.
- [2] M. Van den Bosch, A. O. Sang, Urban Natural Environments as Nature-Based Solutions for Improved Public Health—A Systematic Review of Reviews, *Environmental Research*, 158, 373-384, 2017.
- [3] N. Grima, W. Corcoran, C. Hill-James, B. Langton, H. Sommer, B. Fisher, The Importance of Urban Natural Areas and Urban Ecosystem Services During the COVID-19 Pandemic. *PloS one*, 15(12), e0243344, 2020.
- [4] P. I. Samuelsson, J. T. Wagner, E. Eriksen Ødegaard, The Coronavirus Pandemic and Lessons Learned in Preschools in Norway, Sweden and the United States, *OMEP Policy Forum*, *International Journal of Early Childhood*, 52(2), 129-144, 2020.
- [5] S. J. Slater, R. W. Christiana, J. Gustat, Recommendations for Keeping Parks and Green Space Accessible for Mental and Physical Health During COVID-19 and Other Pandemics, *Prev. Chronic Dis.* 17, 2020.
- [6] B. Rader, C. M. Astley, K. T. L. Sy, K. Sewalk, Y. Hswen, J. S. Brownstein, M. U. Kraemer, Geographic Access to United States SARS-CoV-2 Testing Sites Highlights Healthcare Disparities and May Bias Transmission Estimates, *Journal of Travel Medicine*, 27(7), 076, 2020.
- [7] G. Hubbard, C. den Daas, M. Johnston, D. Dixon, Sociodemographic and Psychological Risk Factors for Anxiety and Depression: Findings from the Covid-19 Health and Adherence Research in Scotland on Mental Health

- (CHARIS-MH) Cross-Sectional Survey, *International Journal of Behavioral Medicine*, 1-13, 2021.
- [8] S. Johnson, C. Dalton-Locke, N. Vera San Juan, U. Foye, S. Oram, A. Papamichail, A. Simpson, Impact on Mental Healthcare and on Mental Health Service Users of the COVID-19 Pandemic: A Mixed Methods Survey of UK Mental Healthcare Staff, *Social Psychiatry and Psychiatric Epidemiology*, 56, 25-37, 2021.
- [9] G. P. Morris, S. A. Beck, P. Hanlon, R. Robertson, Getting Strategic About the Environment and Health, *Public Health*, 120(10), 889-903, 2006.
- [10] W. Qiu, S. Rutherford, A. Mao, C. Chu, The Pandemic and Its Impacts, *Health, Culture and Society*, 9, 1-11, 2017.
- [11] N. Madhav, B. Oppenheim, M. Gallivan, P. Mulembakani, E. Rubin, N. Wolfe, *Pandemics: Risks, Impacts, and Mitigation*, 2018.
- [12] J. Maas, R. A. Verheij, S. de Vries, P. Spreeuwenberg, F. G. Schellevis, P. P. Groenewegen, Morbidity is Related to a Green Living Environment, *Journal of Epidemiol and Community Health*, 63:967-973, 2009.
- [13] H. Snyder, Literature Review as a Research Methodology: An Overview and Guidelines, *Journal of Business Research*, 104, 333-339, 2019.
- [14] L. Loures, R. Santos, & T. Panagopoulos, Urban parks and sustainable city planning-The case of Portimão, Portugal, *15(10)*, 171-180, 2007.
- [15] J. Collins, *The Architecture and Landscape of Health: A Historical Perspective on Therapeutic Places 1790-1940*, Routledge, 2020.
- [16] N. S. Mazelan, *Urban Design Elements Pertaining to Liveable Urban Parks: A Study of Two Urban Parks in Kuala Lumpur*, Jabatan Perancangan Bandar dan Wilayah, Fakulti Alam Bina, University Malaya, 2015.
- [17] F. Chen, Grant Park vs. Millennium Park: evolution of urban park development, 2013.
- [18] K. R. Jones, 'The Lungs of the City': Green Space, Public Health and Bodily Metaphor in the Landscape of Urban Park History. *Environment and History*, 24(1), 39-58, 2018.
- [19] S. Maulan, Seremban urban park, Malaysia: a preference study, Virginia Tech, 2002.
- [20] S. P. Church, From street trees to natural areas: retrofitting cities for human connectedness to nature. *Journal of environmental planning and management*, 61(5-6), 878-903, 2018.
- [21] A. Chiesura, The role of urban parks for the sustainable city, *Landscape and urban planning*, 68(1), 129-138, 2004.
- [22] P. H. Gobster, Urban park restoration and the "museumification" of nature, *Nature and Culture*, 2(2), 95-114, 2007.
- [23] M. M. Abdelhamid & M. M. Elfakharany, Improving urban park usability in developing countries: Case study of Al-Shalalat Park in Alexandria, *Alexandria Engineering Journal*, 59(1), 311-321, 2020.
- [24] P. A. Sandifer, A. E. Sutton-Grier & B. P. Ward, Exploring connections among nature, biodiversity, ecosystem services, and human health and well-being: Opportunities to enhance health and biodiversity conservation, *Ecosystem services*, 12, 1-15, 2015.
- [25] S. P. Church, From street trees to natural areas: retrofitting cities for human connectedness to nature. *Journal of environmental planning and management*, 61(5-6), 878-903, 2018.
- [26] G. N. Bratman, C. B. Anderson, M. G. Berman, B. Cochran, S. de Vries, J. Flanders, C. Folke, H. Frumkin, J. J. Gross, T. Hartig, P. H. Kahn, M. Kuo, J. J. Lawler, P. S. Levin, Lindahl, T., Meyer-Lindenberg, A., Mitchell, R., Ouyang, Z., Roe, J., Daily, G.C., (2019). Nature and mental health: an ecosystem service perspective. *Sci. Adv.* 5 (7).
- [27] Frumkin, H., Bratman, G. N., Breslow, S. J., Cochran, B., Kahn Jr, P. H., Lawler, J. J., & Wood, S. A. (2017). Nature contact and human health: A research agenda. *Environmental health perspectives*, 125(7), 075001.
- [28] Svendsen, E. S., Campbell, L. K., & McMillen, H. L. (2016). Stories, shrines, and symbols: Recognizing psycho-social-spiritual benefits of urban parks and natural areas. *Journal of ethnobiology*, 36(4), 881-907.
- [29] Wong, K. K., & Domroes, M. (2005). The visual quality of urban park scenes of Kowloon Park, Hong Kong: likeability, affective appraisal, and cross-cultural perspectives. *Environment and Planning B: Planning and Design*, 32(4), 617-632.
- [30] Hami, A. (2009). *Users' Preferences of Usability of Urban Parks in Tabriz, Iran* (Doctoral dissertation, Universiti Putra Malaysia).
- [31] McCormack, G. R., Rock, M., Toohey, A. M., & Hignell, D. (2010). Characteristics of urban parks associated with park use and physical activity: A review of qualitative research. *Health & place*, 16(4), 712-726.
- [32] Yuen, B. (2011). Centenary paper: Urban planning in Southeast Asia: perspective from Singapore. *The Town Planning Review*, 145-167.
- [33] Christiansen, G., Conner, N., & McCrudden, M. (2001). The value of public open space for community service provision, (No.0731363973). Sydney: Sydney Urban Parks Education and Research Group, SUPER Group technical report series.
- [34] Malek, N. A., Mariapan, M., & Shariff, M. K. M. (2012). The making of a quality neighbourhood park: A path model approach. *Procedia-social and behavioral sciences*, 49, 202-214.
- [35] Shafee, F. A. A., & Kamaruddi, S. M. (2019). The effective characteristics of an urban park through visitor's perception. *Case Study KLCC Park. Built Environment Journal*, 16(2), 1-14.
- [36] Gössling, S., Scott, D., & Hall, C. M. (2020). Pandemics, tourism and global change: a rapid assessment of COVID-19. *Journal of sustainable tourism*, 29(1), 1-20.
- [37] Qiu, W., Rutherford, S., Mao, A., & Chu, C. (2017). The pandemic and its impacts. *Health, culture and society*, 9, 1-11.
- [38] Howie, E. K., Guagliano, J. M., Milton, K., Vella, S. A., Gomersall, S. R., Kolbe-Alexander, T. L., ... & Pate, R. R. (2020). Ten research priorities related to youth sport, physical activity, and health. *Journal of physical activity and health*, 17(9), 920-929.
- [39] Huremović, D. (2019). Brief history of pandemics (pandemics throughout history). *Psychiatry of pandemics: a mental health response to infection outbreak*, 7-35.
- [40] Piret, J., & Boivin, G. (2021). Pandemics throughout history. *Frontiers in microbiology*, 11, 631736.
- [41] Sampath, S., Khedr, A., Qamar, S., Tekin, A., Singh, R., Green, R., & Kashyap, R. (2021). Pandemics throughout the history. *Cureus*, 13(9).
- [42] Davies, A., Thompson, K. A., Giri, K., Kafatos, G., Walker, J., & A. Bennett, Testing the efficacy of homemade masks: would they protect in an influenza pandemic? *Disaster medicine and public health preparedness*, 7(4), 413-418, 2013.
- [43] J. M. Barry, *The great influenza: The story of the deadliest pandemic in history*, Penguin UK, 2020.
- [44] J. R. Wolch, J. Byrne, & J. P. Newell, Urban green space, public health, and environmental justice: The challenge of making cities 'just green enough', *Landscape and urban planning*, 125, 234-244, 2014.
- [45] K. T. Smiley, T. Sharma, A. Steinberg, S. Hodges-Copple, E. Jacobson, & L. Matveeva, More inclusive parks planning: Park quality and preferences for park access and amenities,

Environmental Justice, 9(1), 1-7, 2016.

- [46] I. Pelgrims, B. Devleeschauwer, M. Guyot, H. Keune, T. S. Nawrot, R. Remmen, R., ... & E. M. De Clercq, Association between urban environment and mental health in Brussels, Belgium, *BMC public health*, 21, 1-18, 2021.
- [47] M. G. Dines, *Garden Cities of the Americas: Greenbelt and El Palomar, a Comparative Case Study on the Model's Translation to the American Continents*, University of Miami, 2016.
- [48] C. C. Konijnendijk, M. Annerstedt, A. B. Nielsen, & S. Maruthaveeran, Benefits of urban parks. A systematic review, A Report for IFPRA, Copenhagen & Alnarp, 2013.
- [49] M. Hillsdon, J. Panter, C. Foster, & A. Jones, The relationship between access and quality of urban green space with population physical activity, *Public Health*, 120, 1127-1132, 2006.
- [50] B. Giles-Corti, M. H. Broomhall, M. Knuiaman, C. Collins, K. Douglas, Ng. K. Lange, & R. J. Donovan, Increasing walking: how important is distance to, attractiveness, and size of public open space? *American Journal of Preventive Medicine*, 28, 169-76, 2005.
- [51] M. M. Sadeghian, & Z. Vardanyan, A brief review on urban park history, classification and function. *International Journal of Scientific & Technology Research*, 4(11), 120-124, 2015.
- [52] M. Annerstedt, P. O. Östergren, J. Björk, P. Grahn, E. Skärbäck, & P. Währborg, Green qualities in the neighbourhood and mental health—results from a longitudinal cohort study in Southern Sweden. *BMC public health*, 12, 1-13, 2012.
- [53] C. W. Thompson, J. Roe, P. Aspinall, R. Mitchell, A. Clow, & D. Miller, More green space is linked to less stress in deprived communities: Evidence from salivary cortisol patterns. *Landscape and urban planning*, 105(3), 221-229, 2012.
- [54] R. Mitchell & F. Popham, Effect of exposure to natural environment on health inequalities: an observational population study. *The lancet*, 372(9650), 1655-1660, 2008.
- [55] U. K. Stigsdotter, O. Ekholm, J. Schipperijn, M. Toftager, F. Kamper-Jørgensen & T. B. Randrup, Health promoting outdoor Environments-Associations between green space, and health, health-related quality of life and stress based on a Danish national representative survey, *Scandinavian journal of public health*, 38(4), 411-417, 2010.
- [56] E. Coombes, A. P. Jones & M. Hillsdon, The relationship of physical activity and overweight to objectively measured green space accessibility and use. *Social science & medicine*, 70(6), 816-822, 2010.
- [57] J. Björk, M. Albin, P. Grahn, H. Jacobsson, J. Ardö, J. Wadbro, ... & E. Skärbäck, E, Recreational values of the natural environment in relation to neighbourhood satisfaction, physical activity, obesity and wellbeing. *Journal of Epidemiology & Community Health*, 62(4), e2-e2, 2008.
- [58] D. Weber, & D. Anderson, D, Contact with nature: Recreation experience preferences in Australian parks, *Annals of Leisure Research*, 13(1-2), 46-69, 2010.
- [59] G. Pereira, S. Foster, K. Martin, H. Christian, B. J. Boruff, M. Knuiaman & B. Giles-Corti, The association between neighborhood greenness and cardiovascular disease: an observational study, *BMC Public Health*, 12, 466-466, 2012.
- [60] M. Gascon, Residential green spaces and mortality: A systematic review, *Environment International*, 86, 2016, 60-67, 2015.
- [61] C. Twohig-Bennett, A. Jones, The health benefits of the great outdoors: A systematic review and meta-analysis of greenspace exposure and health outcomes, *Environmental Research*, 166, 628-637, 2018.
- [62] M. Carmona, *Public places urban spaces: The dimensions of urban design*, Routledge, 2021.
- [63] Z. Hu, J. Liebens, K. R. Rao, Linking stroke mortality with air pollution, income, and greenness in northwest Florida: an ecological geographical study, *International Journal of Health Geographics*, 7, 20, 2008.
- [64] C. Nicol & R. Blake, Classification and use of open space in the context of increasing urban capacity, *Planning practice and research*, 15(3), 193-210, 2000.
- [65] M. Neuvonen, T. Sievänen, S. Tönnies & T. Koskela, Access to green areas and the frequency of visits—A case study in Helsinki. *Urban Forestry & Urban Greening*, 6(4), 235-247, 2007.
- [66] R. M. Karade, V. S. Kuchi, & J. Kabir, The role of green space for sustainable landscape development in urban areas. In IV International Conference on Landscape and Urban Horticulture, 73-76, 2013.
- [67] M. Van den Berg, W. Wendel-Vos, M. van Poppel, H. Kemper, W. van Mechelen & J. Maas, Health benefits of green spaces in the living environment: A systematic review of epidemiological studies. *Urban forestry & urban greening*, 14(4), 806-816, 2015.
- [68] K. J. Bowen & M. Parry, The evidence base for linkages between green infrastructure, public health and economic benefit, *Economic Value of Green Infrastructure*, 2015.
- [69] M. P. White, I. Alcock, B. W. Wheeler & M. H. Depledge, Would you be happier living in a greener urban area? A fixed-effects analysis of panel data. *Psychological science*, 24(6), 920-928, 2013.
- [70] P. Grahn & U. A. Stigsdotter, Landscape planning and stress. *Urban forestry & urban greening*, 2(1), 1-18, 2003.
- [71] R. Louv, *Last Child in the Woods. Saving Our Children from Nature-Deficit Disorder*, New York: Workman Publishing Company, 2005.
- [72] World Health Organization, *Urban green spaces and health* (No. WHO/EURO: 2016-3352-43111-60341), World Health Organization. Regional Office for Europe, 2016