

Revisiting Spatial Justice and Urban Parks in the Post-COVID-19 Era: A Systematic Literature Review

Mohammad Shahidul Hasan Swapan ^{1,*}, Shamima Aktar ¹ and Jeremy Maher ²

¹ School of Design and the Built Environment, Curtin University, Bentley, WA 6102, Australia; shamima.aktar@curtin.edu.au

² Water Corporation, Perth, WA 6007, Australia; jeremy.maher@watercorporation.com.au

* Correspondence: m.swapan@curtin.edu.au; Tel.: +61-8-9266-1999

Abstract: Urban parks, integral to city life, have long contributed to the well-being of residents through various ecosystem services. Previous studies consistently highlighted unequal park distribution and access, and the COVID-19 pandemic has exacerbated these disparities. From a spatial justice perspective, this review examines urban parks' roles during the pandemic, the impact on equity and access, and how evolving park usage characteristics inform future management challenges. Analysing 53 peer-reviewed studies and 11 online materials from January 2020 to April 2023, this review reveals a significant increase in park visitors during the pandemic, causing challenges in accommodating the surge due to lockdown measures. The findings underscore physical and social justice dimensions, revealing disparities in park access during COVID-19. These challenges prompt reevaluating urban parks' potential for well-being and ecosystem benefits, advocating for inclusive decision-making to enhance community resilience and socialisation. The COVID-19 crisis highlighted planning and management challenges, emphasising the need for a more sustainable, liveable, and responsive approach to urban park planning.

Keywords: COVID-19; urban parks; spatial justice; inequality; park visitation; park management



Citation: Swapan, M.S.H.; Aktar, S.; Maher, J. Revisiting Spatial Justice and Urban Parks in the Post-COVID-19 Era: A Systematic Literature Review. *Sustainability* **2024**, *16*, 3929. <https://doi.org/10.3390/su16103929>

Academic Editor: Baojie He

Received: 2 April 2024

Revised: 5 May 2024

Accepted: 6 May 2024

Published: 8 May 2024



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1. Introduction

Implementing urban greening mechanisms, including parks, trees, and gardens, has been seen as a solution to various socio-cultural, economic, and environmental challenges emanating from urban growth [1]. Urban parks have been considered essential to the city's health, offering recreational, aesthetic, ecological, and leisure benefits [2]. A major shift in the idea and purpose of urban parks was observed during the early 19th century, coinciding with the Industrial Revolution. The initial purpose of parks was to appreciate the beauty of nature, which evolved into a multifaceted area that caters to various community requirements [3]. The design elements of parks strive to balance satisfying aesthetic and nature-related desires while supporting community activities. They further foster inclusivity by bringing diverse groups of people together [1]. Urban parks have gradually become an integral part of increasingly urbanised societies, seeking to enhance the quality of civic life by offering a range of ecosystem services [4,5].

The ecosystem services of urban parks encompass provisioning, regulating, supporting, and cultural functions [6,7]. Their significance lies in providing wildlife habitats that contribute to biodiversity conservation [8]. In addition, the vegetation and green coverage in the parks play a critical role in purifying the air, cooling the surrounding environment, and reducing the negative impacts of urban heat [9]. The replacement of green agricultural land by the buildup of impervious areas adversely affects the thermal balance of cities [10]. Several scientific studies have tested and proved that the vegetation cover in urban parks has a qualitative impact on temperature difference [11]. Apart from these ecological services, urban parks offer considerable benefits in improving psychological well-being and

promoting social cohesion [12]. In today's rapidly urbanising world, the synergies between humans and nature hold tremendous potential to enhance the liveability and sustainability of cities and towns [2,13]. Regular access to urban parks is also associated with improved well-being compared to those who lack such opportunities [14,15].

In late December 2019, the world encountered a new wave of COVID-19 disease outbreaks, devastatingly affecting human lives and severely impacting global public health systems [16]. By the first quarter of 2020, it escalated into a global pandemic, affecting almost every country [17]. In response to curbing its spread, various unprecedented measures were implemented, including long-term lockdowns, social distancing, mobility restrictions, border closures, and other containment strategies [16,18,19]. Many countries restricted human movement, permitting travel only for essential services [16,20]. The abrupt closure of activities such as businesses, schools, and workplaces, coupled with quarantine and self-isolation, led to negative physiological and psychological effects on societies [21,22].

During this extended period of uncertainty and isolation, urban parks emerged as a unique source of community resilience [23]. The growing literature has demonstrated a significant increase in park usage for recreational activities, sports, and relaxation during the COVID-19 pandemic crisis [24–26].

Nevertheless, several studies have pointed out existing disparities and injustices in park distribution, leading to unequal access to parks, particularly during this time. These limitations have hindered the park usage of specific societal groups, highlighting the need to address these issues to ensure equitable access to public spaces, even in times of crisis [23,27]. We undertook a systematic literature review (SLR) of published studies to examine the impacts of COVID-19 on urban parks comprehensively. This review aimed to elucidate the utilisation patterns of urban parks during the pandemic and discern their effects on the city's spatial justice, with a focus on promoting physical justice (e.g., accessibility), social justice (e.g., diversity and inequality), and rights to the city (e.g., participation).

This paper reviews global urban park usage studies from January 2020 to April 2023. It addresses three fundamental inquiries: (i) the roles played by urban parks in supporting communities during the COVID-19 pandemic, (ii) the impact of the pandemic on equity and access to urban parks, and (iii) how the evolving characteristics of park usage inform future management challenges. The review facilitated the development of a model characterising future urban parks, with a renewed emphasis on their ecosystem services following the pandemic. The paper is organised into six sections. The current and following sections establish the background and introduce the research questions that guide the study. The second section discusses the theoretical framework of spatial justice in relation to urban park usage. The next section elaborates on the systematic literature review process, presenting details on filtering and screening relevant documents. The fourth section provides a report on the bibliographical characteristics and thematic analysis of the papers studied, focusing on aspects related to urban park usage, equity and access, and park management. The subsequent section of the paper delves into a detailed discussion of the research findings, aiming to enrich the spatial justice framework. This discussion also outlines the implications of the pandemic on park planning and management strategies. The paper's final section summarises the key findings and highlights areas that demand further research exploration in the future.

2. Theoretical Framework

2.1. *Reinvigorating the Role of Urban Parks during the Pandemic*

While urban parks have a range of ecosystem services, they have come under increased scrutiny by academics and practitioners during COVID-19. The pandemic highlights several concerns related to fairness, equity, and the fundamental right to access and enjoy the city, primarily due to the challenges associated with accessing and fully utilising the benefits of the space. During the pandemic, urban parks emerged as havens for individuals seeking respite from the anxiety and mental stress brought on by COVID-19, providing

a return to green environments that offered relaxation, physical benefits, and increased social connectedness with neighbours [17,28]. Numerous studies have revealed a notable increase in the tendency to visit urban green spaces during the pandemic across various countries. For instance, research conducted in Oslo (Norway) showed an almost 300% increase in outdoor recreational activities and a 19% rise in overall park visitations [29]. Similarly, Germany, Italy, Spain, China, Singapore, Mexico, and Australia also reported an upward trend in urban park use [17,22,30–34].

However, it is important to note that in the initial phase of the pandemic, many public parks and green spaces were closed to mitigate the risk of disease transmission [35,36]. In Australian cities, local governments took the precaution of taping up and locking down the majority of their playgrounds during the early stages of the disease spread [37,38]. The implementation of stringent homebound lockdown measures initially led to a reduction in park visitation in certain countries, as observed in studies by Ugolini et al. (2020) and Geng et al. (2021) [22,39]. However, as these lockdown measures gradually eased and individuals were permitted to travel shorter distances, there was a notable upswing in overall park usage during the COVID-19 period, as indicated by research conducted by Poortinga et al. (2021) and Venter et al. (2021) [26,29]. This shift in park usage patterns reflects the importance of green spaces as valuable resources for the public, providing opportunities for outdoor activities and relief during restricted mobility and isolation.

On the contrary, studies also identified that the surge in park visitors put additional pressure on existing park facilities. Reports of overflowing toilets and increased waste requiring multiple cleanings and emptying became prevalent [40,41]. The frequent human presence in protected areas also affected wildlife biodiversity, damaging habitats in various regions [41,42].

2.2. Theory of Spatial Justice in Urban Park Context

Apart from a sudden surge in park visitors, disparities in accessing parks during the pandemic were evident, with pre-existing unequal distributions of urban parks in disadvantaged areas exacerbating the situation further [18,23]. Previously, justice and rights within urban contexts have been heavily studied by several scholars [43–46]. The multidimensionality of justice operates through materialistic space to the socio-spatial and economic negotiation, recognition, and representation of inequality and deprivation that city dwellers may have faced in obtaining access to urban resources [47,48]. Among many other forms of urban justice, Kunzmann (1998) coined spatial justice or spatial equity in determining “equal access to basic public facilities, measured in distances, such as accessibility to schools, health facilities, open spaces or cultural events” [46]. In the modern context, Gautreau and Noucher (2016) emphasise the significance of access to information as a pivotal factor in mitigating disparities and fostering a just city [49]. This concept is particularly crucial in densely populated urban environments. Kunzmann (1998) extends this notion to encompass the concept of access to public open space (PoS), which includes urban parks, waterfronts, and other public recreational areas [46]. The availability and accessibility of such public spaces play a vital role in ensuring equity and social justice within cities, contributing significantly to the overall well-being and quality of life for urban residents. According to Soja (2010), the concept of spatial justice underscores the profound interconnection between social justice and spatiality or physicality, encompassing considerations of democracy and human rights (Figure 1) [50].

Spatial justice highlights the profound impact of spatial arrangements on social justice, enabling social interactions within physical spaces. This perspective has been extensively explored within the broader framework of spatial justice theory, particularly concerning the privatisation of urban parks and the imposition of restricted access through scheduled park use, as demonstrated in the research of Rigolon and Németh (2018) [51]. When it comes to urban parks, the concept of physical justice examines the types and scopes of parks available in different urban areas, considering factors such as quality, accessibility, and diversity [50,52]. Quantity identifies that the number and presence of such concrete

physical spaces should be sufficient for a certain geographical unit [53], whereas quality reveals the greater amenity of this space in terms of land use and service availability distributed in such a way that can accommodate a variety of people to improve their quality of life [54]. Physical justice also emphasises that the arrangements and resources are distributed evenly to all residents, and they can access the facility without any disparity [55]. Additionally, the literature also suggests that spatial injustice may happen due to the process of capitalism and urbanisation [56]. It delves into the impact of the capitalist system and socio-economic disparities and injustices resulting from the urbanisation process [57]. The process of urbanisation may lead communities to move into lower-standard marginalised areas, whereas some enjoy geographies of privilege [58]. People living in higher-standard areas may enjoy high-quality urban parks, whereas the underprivileged face multifaced barriers to accessing these green spaces [45]. Furthermore, this framework addresses the equal civic rights of every citizen to influence urban governance and participate in decision-making processes related to public open spaces [45,59]. Public involvement in public open space design allows people from different backgrounds and cultures to engage, and this participatory process allows space for collaborative and accommodative green spaces that aim to meet the demands of everyone rather than catering only to others [60]. In essence, this comprehensive framework conceptualises the broader notion of justice in public open spaces, encompassing the spatiality of social justice, freedom, democracy, and human rights, as articulated in the work of Jian et al. (2021) [61].

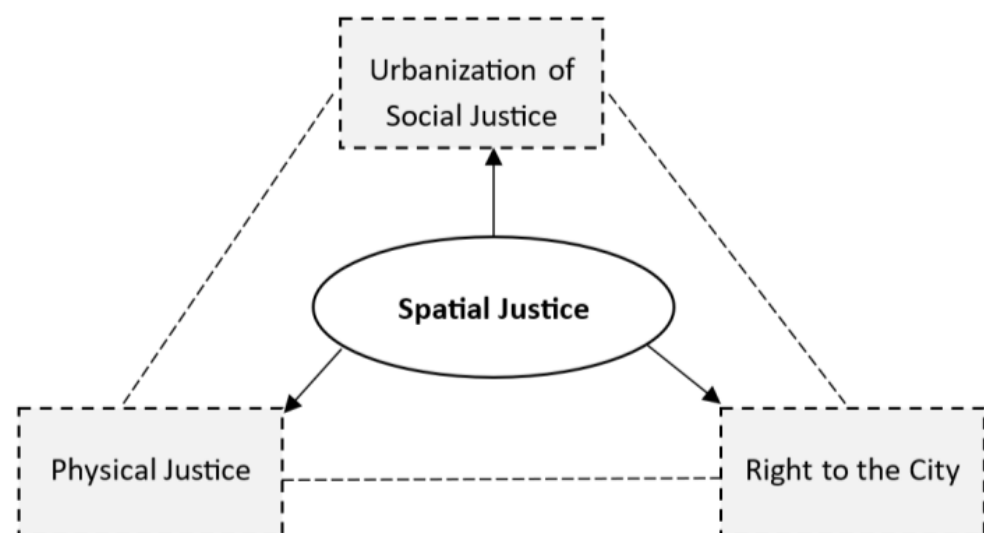


Figure 1. Spatial justice within urban park's context. Adopted from [45,50].

The emergence of COVID-19 on a global scale reignited scholarly discussions surrounding justice, equity, and access to urban parks. Disparities in park access were exacerbated by factors such as socio-economic status, ethnicity, religion, and land use, as observed in the research by Pipitone and Jović (2021) [18]. This emphasised the urgent need to address these inequalities, ensuring that all community members have equitable access to green spaces, which have proven essential for both physical and mental well-being, especially during challenging periods such as the pandemic. Acknowledging the heightened awareness of park usage and the ensuing challenges in park management, Moore and Hopkins (2021) advocate for a paradigm shift, proposing to view urban parks and open spaces as critical urban infrastructure [27]. This perspective emphasises leveraging the multiple health, social, economic, and environmental benefits these spaces provide, thereby underscoring the vital role of parks in promoting holistic community well-being and resilience.

3. Materials and Methods

This research work employed a systematic five-step methodology [62] (Supplementary) to identify the pertinent literature for this study, with a specific focus on perceived and observed changes in park utilisation during the COVID-19 pandemic period. Initially, a methodical search was executed across three distinguished academic databases: Scopus, Science Direct, and Web of Science. Subsequently, an additional search was conducted within Google Scholar and other online sources that are not peer-reviewed, such as *'the Conversation'* and other media releases. This comprehensive approach was adopted to encompass a wide spectrum of contemporary research and innovative ideas.

Following the compilation of the database, an exhaustive elimination of duplicate documents was performed. Subsequently, the articles underwent a meticulous screening process guided by considerations of relevance, ascertained through an evaluation of their titles, keywords, and publication dates spanning from 2020 to 2023. Finally, the abstracts of all shortlisted papers were subjected to a thorough review to identify the most relevant documents for inclusion in this study. This rigorous methodology ensures the incorporation of the pertinent and up-to-date literature, thereby facilitating a comprehensive analysis of the changes in park utilisation during the COVID-19 pandemic period.

The keywords employed in this review encompassed the following phrases: "COVID-19 pandemic AND Park use", "COVID-19 pandemic AND Park use change", and "COVID-19 pandemic AND Urban Parks OR Green Space". Additionally, the review incorporated universal terms pertaining to urban parks, which are commonly recognised and utilised worldwide. These terms encompass pocket parks, community parks, neighbourhood parks, municipal parks, city parks, and regional parks. These diverse types of parks offer people accessible spaces for leisure activities and engagement in both active and passive recreational pursuits, making them suitable subjects for review in this context.

As part of our thorough review of the literature, we conducted an analysis of urban local parks that were under the management of local authorities and available for use during the COVID-19 lockdown. Our search initially yielded 1543 articles and 36 non-peer-reviewed online resources, which we then narrowed to 1226 by removing duplicates. We then carefully examined the titles and keywords of the remaining articles to filter out any irrelevant information that did not relate to the changes in the use of urban parks and pandemic management issues. As a result, we identified 184 relevant articles and 11 online resources that met our criteria. The steps followed to conduct the review are shown in Figure 2.

After going through the abstracts of the selected papers, we narrowed down the selection to 53 peer-reviewed and 11 online materials. We excluded papers that were not within the scope of the impact of COVID-19 on urban parks usage or management, for example, COVID-19 modelling, biodiversity, tourism, and business modelling of urban parks. We also looked at how lockdowns affected the frequency of park visits, park activities, visitation structures, equity, inclusivity, and access issues. We also examined management measures adopted by the government, park authorities, and community initiatives to manage the parks during the pandemic and immediate post-COVID-19 period. Future planning suggestions to manage COVID-19-like situations were also considered. We only included papers in English that specifically analysed the impact of COVID-19 on urban parks. Finally, we conducted an in-depth review of the shortlisted papers using a Microsoft Excel template to record the bibliographic and thematic information demonstrating the pattern, content, and direction of research in this area. Following a comprehensive analysis of the selected articles, we diligently extracted the primary discoveries and fundamental ideas of the studies and incorporated them into a structured framework. This approach enabled us to organise the information better and conduct a comparative analysis of studies conducted in various countries. During the initial evaluation, we identified overarching topics, including changes in park usage patterns; disparities in park access and fairness based on economic status, race, age, or gender identity; and the effects on park administration. Additionally, we provided recommendations for more advanced interpretation in future planning.

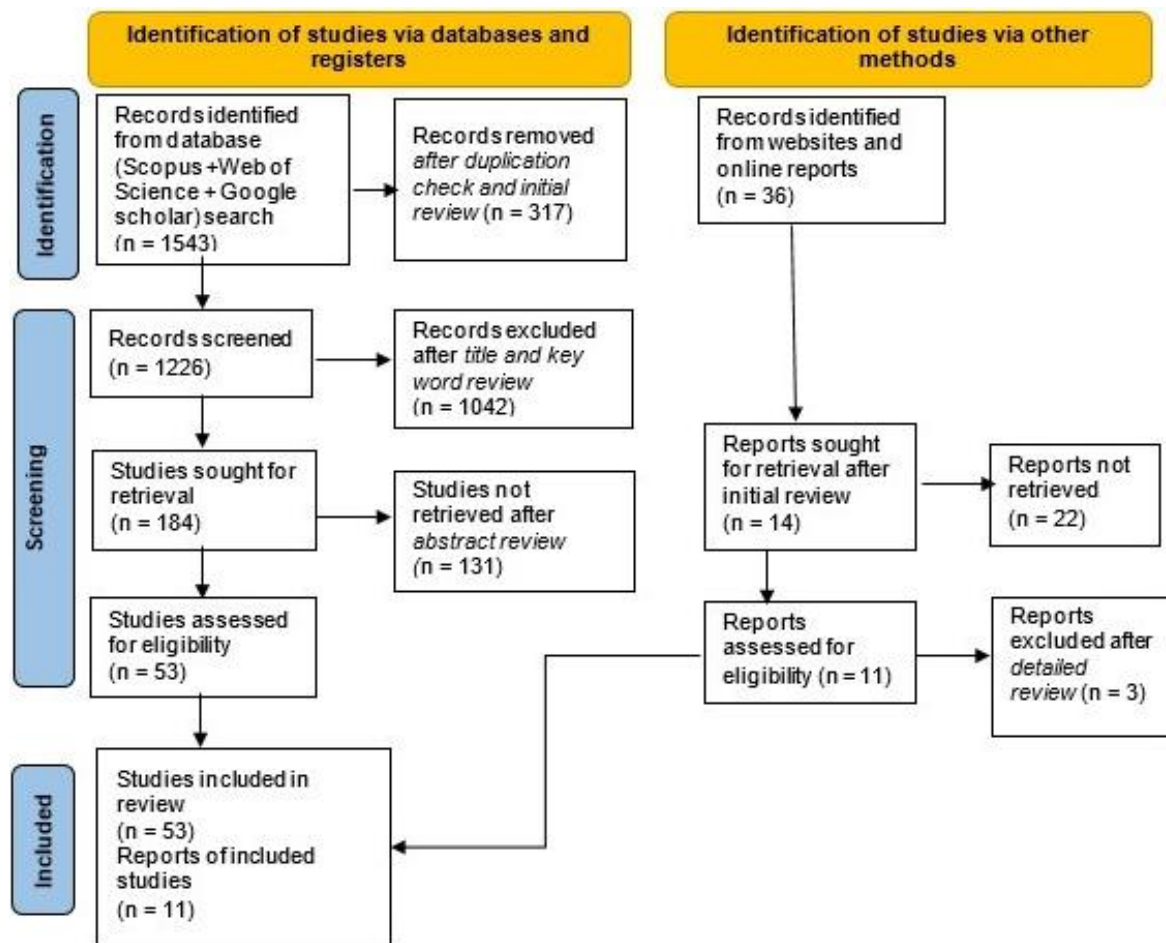


Figure 2. Steps involved in the systematic literature review.

We conducted a comprehensive literature search to include studies published worldwide. However, this review only included publications between the years 2020 and 2023. Works published after 2023 were not included. Another major limitation was the exclusion of studies not published in English. COVID-19 affected the entire world, and it is obvious that there might be many important and relevant works that could not be included due to language barriers. To reduce literature bias, we also reviewed and included newspaper articles, online reports, and other published data sources. In addition, to avoid reporting bias, all the authors sat together to agree on the themes identified and the literature to be included under each reporting theme. An excel tool was developed by the authors where all information was sorted under agreed themes and sub-themes. Authors worked together to report the primary information extracted from the studies included in this review.

At the outset, a comprehensive overview of the studies carried out in this field was presented, which included details about the publication trends, the countries of publication, and the data collection methods employed during the COVID-19 pandemic period. Based on the results, this study proposes some policy implications and management recommendations that could be incorporated into urban park design interventions and development planning initiatives. This would enhance the resilience of these spaces and make them more vibrant, particularly during pandemics similar to COVID-19.

4. Results

4.1. Bibliographical Analysis

The COVID-19 pandemic was a new and unprecedented experience for the world. Initially, research articles focused mainly on the health impacts and clinical aspects of the virus. However, over time, researchers began to explore other related topics. Upon

reviewing most of the articles published in 2021, it was observed that there was a decline in publications in 2022, as shown in Figure 3a. There are several potential reasons behind this fluctuation in publication numbers over the past three years. In early 2020, scientists and researchers primarily focused on limiting the transmission of the virus. This left limited attention and resources to investigate the impact of COVID-19 on the built environment and liveability. As a result, fewer articles were published on the significance of urban parks during lockdown situations.

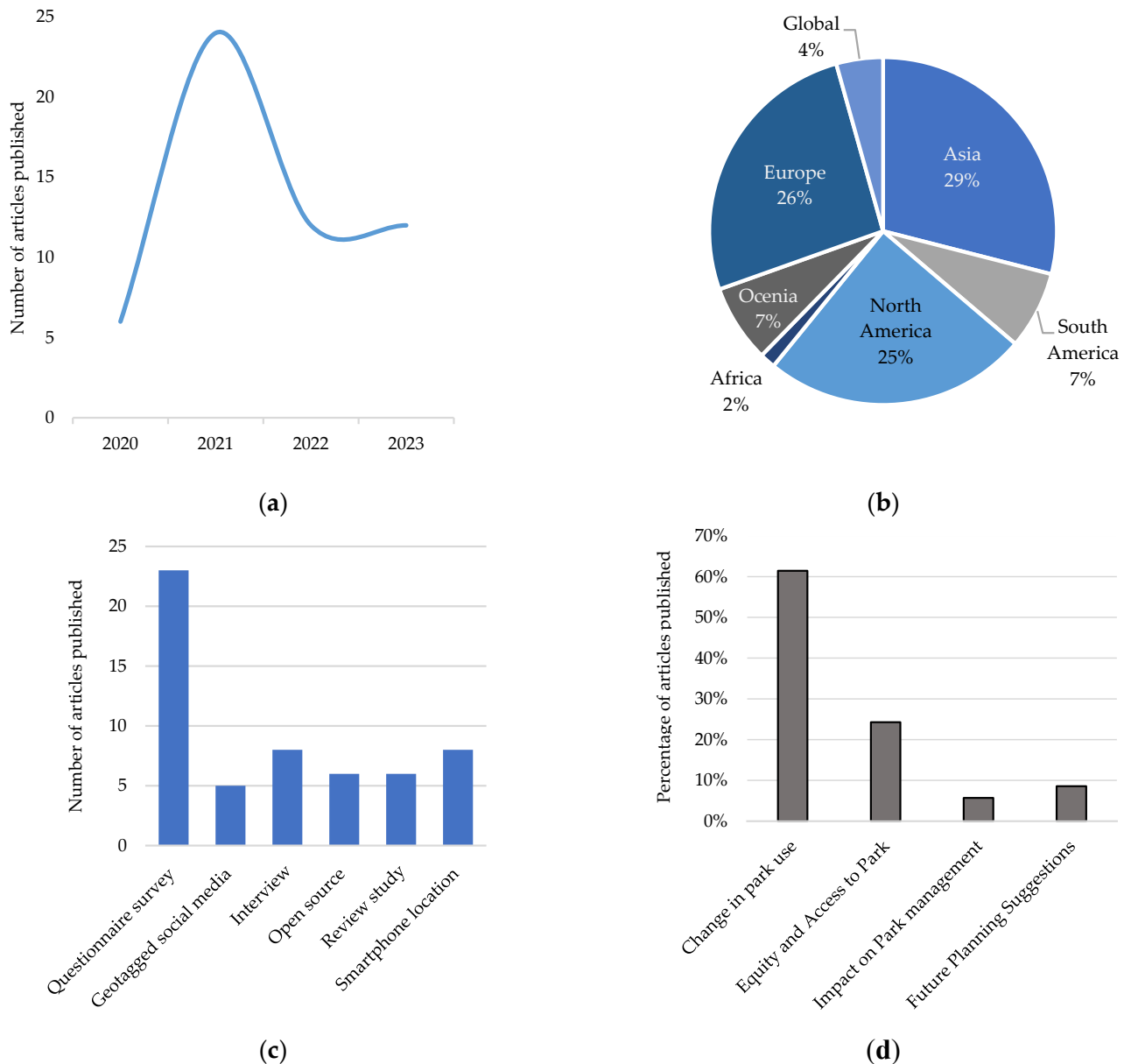


Figure 3. Synthesis of bibliographical analysis; (a) number of publications by year; (b) % of publications by region; (c) number of publications by data collection strategy; (d) % of publications by their core themes.

However, as the pandemic progressed into 2021, more information became available about the virus. This allowed researchers to shift their focus from emergency crisis management to planning and strategies aimed at reducing the impact of the pandemic and adapting to the new normal. This shift highlighted the importance of urban parks and green spaces in meeting physical, mental, and social needs safely during periods of

restricted mobility. As a greater pool of data became available, more studies appeared, contributing to a pandemic-resilient urban form.

By 2022, the volume of publications began to decline as fundamental relationships had already been addressed. A range of case studies became available to understand the pattern and characteristics of benefits from urban parks in crisis management. The synthesis of the findings on bibliographical analysis is presented in Figure 3.

The study found that the majority of publications were from Asia (29%), followed by Europe (26%) and North America (25%) (Figure 3b). Notably, the USA had the highest number of articles (15), followed by China, South Korea, and Australia (four each). These regions saw a higher number of COVID-19 cases in 2020, which may have influenced researchers to engage in more COVID-19-related studies.

Most of the articles that have been published utilised questionnaires as their primary method of data collection, as shown in Figure 3c. However, due to the pandemic, authors shifted their focus towards online web-based surveys. Nevertheless, some comparative studies have evaluated the situation before and after COVID-19 using both in-person and online questionnaires. For research articles concentrating on user mobility in urban parks and green spaces, web-based mobility data such as Google mobility reports, social media data, or STRAVA are commonly used. Some studies have also gathered geo-tagged spatial data from mobile phone companies.

4.2. Thematic Perspectives

After analysing a selection of articles, four major themes related to COVID-19 and urban parks emerged, as shown in Figure 3d: changes in park usage, equity and access to parks, effects on park management, and future planning outlook. The theme of “park use changes” was the most commonly discussed across all articles, with authors exploring the impact of the pandemic on park usage patterns and people’s attitudes towards urban parks and green spaces, as well as comparing park usage before and after the pandemic. Out of the 53 articles reviewed, 49 explored how COVID-19 affected park usage. Additionally, multiple studies observed the impact of changes in park usage on park management, as urban park teams faced various challenges and approached management decisions differently to adapt to the situation. The authors also examined how the pandemic worsened existing disparities in access to urban parks and associated green spaces, particularly for marginalised communities. Although the socio-spatial disparity in park access is not new, it was amplified by the pandemic and the varying restrictions put in place. It is noteworthy that articles focusing on equity and access issues are particularly concentrated in the context of American cities.

The reviewed articles comprehensively explored various aspects or sub-themes of urban parks affected by COVID-19. Figure 4 illustrates the percentile distribution of sub-themes covered by the selected studies under each broader theme identified in the review. It is observed that COVID-19 has heightened concerns regarding physical and recreational aspects in urban parks, especially during periods of isolation and lockdown measures. The distance from parks emerged as a significant factor, exacerbating inequalities among disadvantaged groups with limited mobility. Notably, the sudden surge of visitors presented challenges for park management, particularly in terms of cleaning and rubbish disposal, highlighting additional concerns for future management strategies.

The following sections examine the discussed sub-themes in greater depth, providing empirical evidence sourced from published studies to support and elucidate the points made.

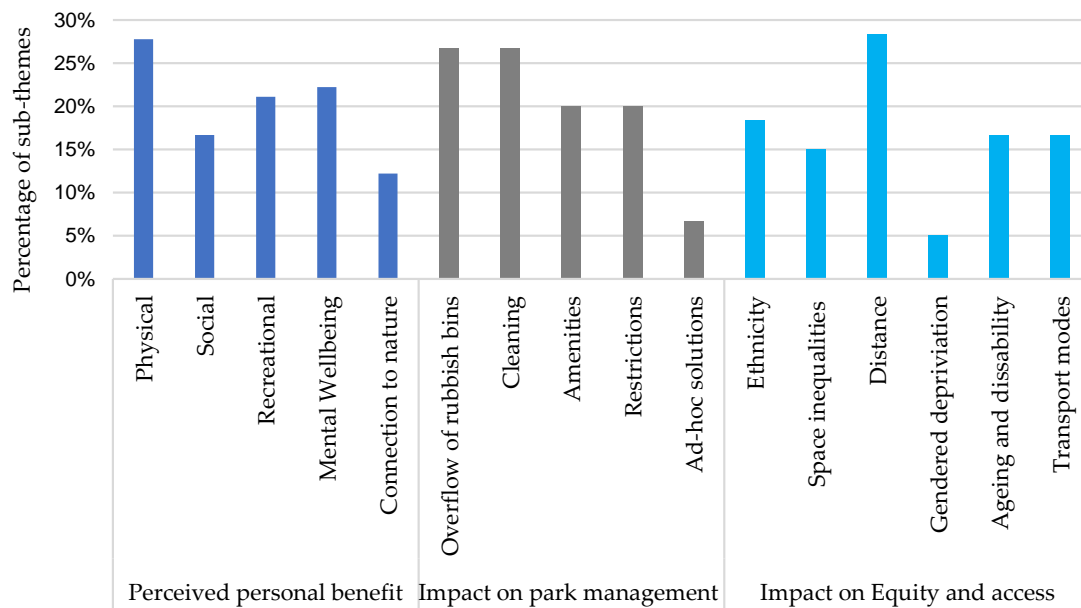


Figure 4. Themes and sub-themes highlighted by the selected studies on COVID-19 and urban park use.

4.2.1. Change in Perceived Benefits and Park Use

During the pandemic period, urban parks have experienced a significant increase in visitation, as confirmed by multiple studies [21,63,64]. Thirty-one articles reviewed showed a consensus that people were visiting urban parks more frequently. One study by Geng et al. (2021) found that park visitation rates have increased up to 50% in various European and Asian countries such as Italy, Spain, Sweden, Japan, and South Korea. Moreover, England and Canada have experienced a more substantial increase of up to 100% [27,65]. The Google Mobility Report for 2020 supports this trend, showing a 20.2% increase in park visits during the COVID-19 pandemic compared to the pre-pandemic baseline period [66].

It is important to acknowledge that in response to the COVID-19 outbreak, several countries imposed stringent lockdown measures, leading to a decline in park attendance. Residents were forced to use nearby parks and green spaces as travel restrictions made larger parks (e.g., national and regional parks) inaccessible. This further highlights the demand for more attractive and ecologically and practically versatile local parks to be utilised in restricted periods. For example, Dushkova et al. (2021) reported demands for more street greening, natural bushland, and pocket parks among Perth residents in Western Australia [21]. As governments began to lift restrictions on urban parks, the number of visitors gradually increased once more [28,65]. Moore & Hopkins (2021) ascertain that “urban parks were closed and then often overwhelmed on reopening, and that managers faced novel and sometimes unmanageable situations” to comply with safety guidelines [27]. Notably, nearly a fifth of the articles examined highlighted that park-goers resumed their regular or even elevated visitation rates upon regaining entry to the parks.

The connection between parks and public health is not new but has become even more significant during the pandemic. During the global pandemic, people turned to parks and green spaces to cope with stress and maintain their physical and mental well-being [22,35,67]. Studies have shown that almost half of the visitors were motivated by the opportunity for physical exercise, as indoor fitness centres were closed. In addition to physical benefits, the studies also highlighted the psychological advantages of visiting urban green spaces, which helped alleviate stress. Some individuals specifically sought out green spaces in densely populated urban areas to relax and enjoy the tranquility of nature. Overall, parks and green spaces played a crucial role in supporting the health and well-being of individuals during the challenging circumstances of the pandemic [68].

4.2.2. Equity and Access to the Park

The existing body of the literature underscores a notable increase in park and green space visitation in urban areas during the COVID-19 pandemic period. However, this surge in utilisation revealed discernible inequities, particularly concerning access between white and non-white populations and affluent and low-income neighbourhoods, as elucidated by Jay et al. (2022) [69]. The bulk of these studies predominantly centred on the United States [18,23,70], the United Kingdom [65], and some European countries such as Germany and France [34]. Nevertheless, disparate access to urban parks during the pandemic was also observed in numerous other countries worldwide [12,27,71].

Notably, nearly 59% of the reviewed articles delved into the various dimensions of deprivation and inequalities that manifested in park visitation patterns. These studies posited that pre-existing spatial inequalities between high-income and low-income populations and communities of colour might have been exacerbated by the pandemic situation [23,72]. For instance, a comprehensive study conducted across 1400 cities and towns in the United States revealed that parks serving People of Colour were half as large and nearly five times as crowded as parks serving majority-white communities. Similarly, parks catering to low-income households were a quarter as large and almost four times as crowded as parks serving high-income households [18]. This pervasive inequality undoubtedly had ramifications for urban park visitation during the pandemic, especially when many outdoor facilities were closed, effectively limiting the opportunities for marginalised communities to access urban parks and green spaces [73].

By employing an open-access text analysis tool called Voyant, we conducted an in-depth analysis of the reviewed articles, specifically focusing on exploring and understanding the disparities in urban park usage during the COVID-19 pandemic (Figure 5). The analysis prominently highlights the word “racialised,” which is strongly associated with “space.” Additionally, it underscores the perception that spaces are racialised not only in terms of their inherent qualities but also in their creation, distribution, and other dimensions.

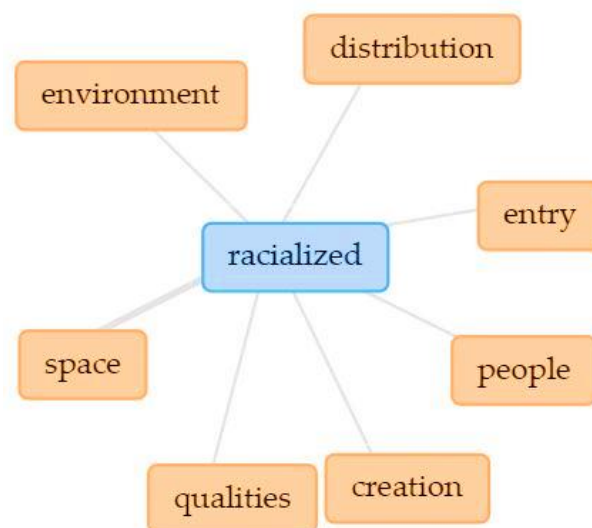


Figure 5. Text analysis of most frequently occurring words in published studies in relation to equity and access to parks.

In conjunction with racial and socio-economic disparities, another crucial factor influencing park visitation frequency is distance [74]. The frequency of park and green space visitation demonstrates an inverse correlation with travel distance; greater distances are linked with less frequent visits [39]. Communities that lack parks within walking distance of their residences face challenges in accessing urban parks easily [70]. Moreover, restrictions on public transportation had adverse effects on park visitation patterns in various cities. Citizens who previously accessed parks via public transport had to curtail

their visits, disproportionately affecting marginalised individuals without access to private vehicles [36].

Notably, a reduction in park visits has been reported among women [39] despite their high recognition of the importance of park visits to seek relief from pandemic-induced exhaustion [30]. The primary reasons behind this reduction may include the lack of parks and green spaces within accessible distances, concerns about safety, and potential threats associated with the influx of park visitors [24].

Furthermore, considering the elevated mortality rates and vulnerability to severe COVID-19-induced health issues among older individuals, they were discouraged from venturing into crowded spaces. This home-bound situation posed challenges in enjoying the openness of nature and engaging in leisure activities in urban parks [75].

Studies also indicated that the disparities in the distribution and access to urban parks vary across countries depending on their population density, economic development, and city size [76]. Cities with higher population densities, e.g., Asian countries, represent lower urban green space coverage in comparison to countries with higher GDP and lower population density, e.g., European cities [77]. The provision of green space and urban parks is still a luxury to many resource-poor countries where health and other basic priorities come first [78]. COVID-19 adversely impacted many of these countries, resulting in limited park visitation by residents of poorer neighborhoods or overcrowded and poorly managed services due to the overflow of park visitors to limited facilities [27].

4.2.3. Impacts on Park Management

Due to the COVID-19 pandemic, urban parks and green spaces have seen a significant increase in usage. As a result, local governments have had to reconsider the roles of park management authorities. After reviewing nine articles, it was found that various solutions had to be implemented to manage the sudden rise in park usage [36,79]. Unfortunately, some parks were unprepared to handle the sudden influx of visitors, leading to overcrowding on walking trails and gathering places. To address this issue, park managers (e.g., in Yosemite National Park in California, USA) had to impose limitations on park use and introduced online permit systems with restricted daily quotas to control the number of visitors during the COVID-19 periods [40]. To assist visitors in deciding when to visit, authorities in Parquemet in Santiago, Chile, and the British Columbia Parks Foundation have even developed experimental online portals that display actual park visitor numbers in real time [27]. The portal helps visitors avoid crowding and plan their visits while also assisting park managers with resource planning for future parks.

Park management authorities are currently facing various challenges due to the increased usage of these public spaces. To prevent overcrowding, temporary traffic restrictions have been implemented on neighbourhood streets. For example, Spennemann reported the following:

“some communities counter-balanced the closure of local urban parks as recreational spaces by expanding on the concept of ‘Sunday-Streets’ and declaring some neighbourhood streets as ‘shared streets’ or ‘slow streets’ where pedestrian use had priority over vehicular use, or by closing streets for vehicular use altogether” [17].

These approaches provided ad hoc solutions for exercise, jogging, and walking pets, though they lack greenery and other ecological services found in parks. There is also evidence in adjusting infrastructure and land use in parks, for example, widening walking trails to maintain social distancing, creating temporary pedestrian and cycling corridors, and converting restricted large green areas (e.g., golf course) to public green space as demands hike during pandemic situations [27]. Among other challenges is the frequent need for toilet cleaning, which results in extended closures [40]. Additionally, littering has become a common issue, necessitating extra waste collection solutions and staff to maintain cleanliness [41]. Studies have also highlighted the importance of adequate lighting for night-time park use [79,80].

5. Discussion and Policy Implications

Since the inception of parks and public spaces, they have frequently been seen as responses to prevailing social and environmental challenges of their respective historical eras. The multifunctionality of urban parks, with their variety of ecosystem functions and services, has a positive impact on human health and well-being [80]. The evolution of lifestyles, urbanisation, climate change impacts, and the recurrent occurrence of pandemics have emphasised the need to integrate pandemic-resilient designs into urban park features. Despite the growing acknowledgment of this need, the body of literature on the practical implications of such designs is still in the process of development. From a planning perspective, ideal urban parks and public open spaces should give the right to all city dwellers to equally enjoy the benefits and services offered, irrespective of any form of injustice and segregation [61]. Several scholars have used the spatial justice concept to measure the performance of urban public open spaces in terms of access, sociability, diversity, service provision, as well as social inclusion [45,50,52].

The concerns about spatial justice in urban parks entered a new phase along with the COVID-19 outbreak. Government and business restrictions imposed in response to the COVID-19 pandemic, such as repeated lockdowns, social distancing measures, limitations on gatherings, and the closure of outdoor recreational facilities, prompted a notable increase in the utilisation of urban green spaces. Neighbourhood and pocket parks garnered increased attention as they could be accessed without the need for public transport or personal vehicles. However, the existing disparities between socio-economically advantaged and disadvantaged neighbourhoods were exacerbated during the pandemic lockdown, leading to intensified space inequalities. Residents from disadvantaged communities often had limited access to urban parks and green spaces, which ultimately affected their overall well-being [34]. Figure 6 illustrates how the collective concept of spatial justice can be explained through the multifaceted impacts of the pandemic on urban parks. During the lockdown, accessibility issues highlighted the importance of physical justice as a means to maintain health and well-being. The global health crisis caused by the COVID-19 pandemic has brought to light discernible disparities in the utilisation of public parks across various demographic strata, encompassing disparate age groups, ethnicities, and income brackets. Consequently, the societal equity advantages associated with urban parks have become more pronounced. The limitations on park usage, such as time and distance restrictions for physical exercise, have added another layer of difficulty that is typically experienced due to the privatisation of urban parks. The evolving landscape of urban park usage and demand for new forms of services and facilities call for enhanced community engagement in park design. This imperative arises from the acknowledgment that individuals should be afforded the opportunity to exercise their entitlement to the urban environment.

Prior studies have consistently reported on the unequal distribution and access to urban parks, particularly among disadvantaged minority communities, low-income individuals, various racial groups, and different age demographics. However, the intensity of these disparities has become even more pronounced during the crisis period, significantly impacting the everyday lives of affected communities [23,43,81]. During the time of restrictions due to the COVID-19 pandemic, urban parks have become the only place where people can interact with each other while maintaining social distancing. It is crucial that these parks have socially responsive and inclusive design features that cater to the needs of diverse groups. With indoor facilities to maintain health and well-being becoming unavailable, parks needed to support additional activities and ensure accessibility to promote physical justice within the society and to foster physical well-being for the broader community. Furthermore, to develop a comprehensive understanding of the reinvigorated local needs arising from COVID-19 experiences, more user-centred studies are required. Such studies are instrumental in informing the development of inclusive and suitable park designs that can effectively meet critical needs during emergencies. The insights gained from such research endeavours contribute to the creation of resilient communities

by ensuring that park designs align with the evolving requirements of the local population, particularly in times of crisis like the COVID-19 pandemic.

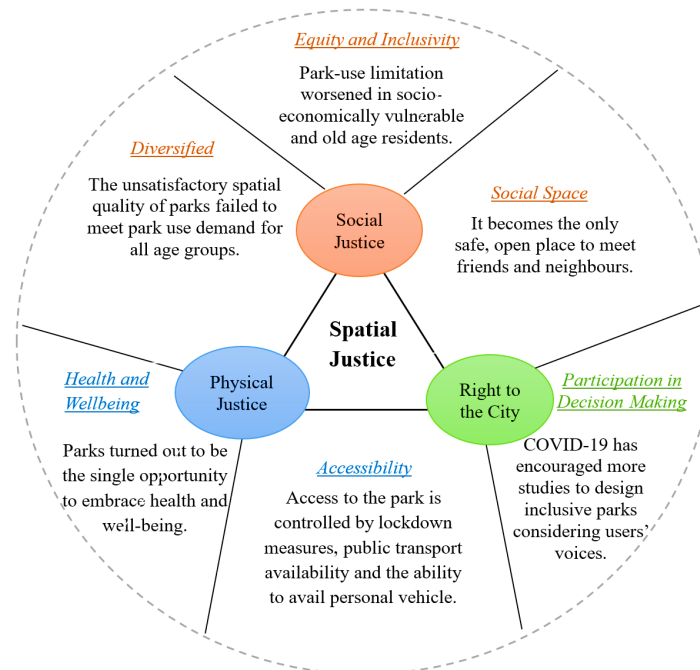


Figure 6. Spatial justice and its implications on urban parks in the post-COVID-19 era; modified from [50].

While the studies called for the expansion of green spaces in cities, they also raised questions for urban designers and planners regarding how existing parks can better meet the demands of the community, especially in the context of future pandemics. This sudden influx of park visitors during the COVID-19 pandemic and lockdown presented significant challenges for park management. Park management teams had to allocate additional resources to handle overcrowded parks while simultaneously implementing health and safety measures to prevent the spread of the virus [27]. In some areas, ad hoc solutions were employed to create outdoor spaces for local residents, such as converting parking spaces into walking and bicycle paths and installing exercise equipment and seating benches in walkways [17,82]. These experiences have prompted a re-evaluation of how traditional urban parks and green spaces may perform in the face of future crises. It became evident that many parks in cities are ill-equipped to meet the outdoor recreational space needs of all segments of the population. Older individuals who require specific physical support often struggle to access nearby parks lacking ramps or wheelchair accessibility. People with physical or mental disabilities also reduced their park visits during lockdowns due to limited access to nearby parks with suitable features [83]. Children, in many cases, were taken to playgrounds designed for adults due to a lack of accessible play spaces specifically designed for them [84]. Urban neighbourhoods and local parks often cater to a single activity focus, such as parks with large soccer fields that may not attract youth interested in skating or basketball [85,86]. The experiences during the COVID-19 pandemic underscore the need to rethink how urban parks and green spaces should function as integral parts of liveable cities, ensuring they benefit a broader range of communities by eliminating inequalities and disparities of all kinds.

A detailed description of the observed effects, along with indications for future park management, is provided in Table 1. This comprehensive analysis aligns with the spatial justice framework outlined in Figure 6, offering a nuanced understanding of the impacts on park usage and the associated management implications for justice, equity, and accessibility within urban spaces.

Table 1. Urban park management implications for spatial justice arising from COVID-19 experiences.

Spatial Justice Principles	Broader Planning Principles	Perspective	COVID-19 and Observed Impacts	Lessons for Future Park Design and Management
Social Justice	Equity	In some instances, urban parks and green spaces are unevenly distributed, resulting in overcrowded areas with limited recreational options.	Residents living in lower-income areas of cities have less opportunity to spend time in green spaces compared to wealthier neighbourhoods. This is due to longer travel times to access urban parks, which are often located further away. The limited availability of public transportation during lockdown has further impacted the ability of these vulnerable communities to visit parks and green spaces.	Develop more open spaces wherever possible in deprived areas to reduce disparity. Existing parks should be safe, welcoming, and accommodative and host people from diverse cultural and economic backgrounds. Establishing a networked and connected green corridor in cities, incorporating features like pocket parks, neighbourhood spaces, green walking or bike corridors, and regional parks, creates a coherent system of green infrastructure across the city. This networked system, compared to single or fragmented green spaces, has the potential to provide more equitable social and environmental benefits.
	Inclusivity	In some cases, park designs did not consider contemporary accessibility design.	Due to physical limitations, older people's access to urban green spaces is limited to nearby parks, which were often overcrowded during the pandemic, causing them to avoid those parks during peak hours.	Make parks more inclusive and allow activity space for all groups of people. During emergency, alternative plans should be implemented, such as special health and safety measures to avoid disease transmission, specific time slots for park visitation, special transport, and parking facilities.
	Social space	In addition to many other environmental, health, or aesthetic impacts, urban parks and green spaces also contribute to communities' social fabric. This social fabric is important for both individual and community pandemic resilience.	People sought open green spaces as a 'safe place' to meet friends and neighbours while respecting the social distancing measures.	Facilitate opportunities, e.g., simple relaxation place, covered space as weather guard, comfortable seating space for small gatherings, to foster community bonding and feel less lonely during crisis.

Table 1. Cont.

Spatial Justice Principles	Broader Planning Principles	Perspective	COVID-19 and Observed Impacts	Lessons for Future Park Design and Management
	Diversity	In some cases, park designs did not consider the different age-diverse design requirements of their communities.	Lack of opportunity to engage in diversified playing or exercise space in accessible local or neighbourhood parks led to sharp decrease in physical activity among young.	Ensure creative park design that can accommodate multiple-benefit infrastructure, e.g., in case of scarce-space plan for segmented small playground for multiple methods of play, including accessible play equipment in kids' spaces that should offer diversified opportunities for a broad population.
Physical Justice	Health and well-being	Access to urban parks is often the only access to natural landscapes that provide public health outcomes to communities.	Urban parks and green spaces became one of the limited opportunities to engage in regular activity to support mental and physical health.	Initiate long-term planning measures to connect this space with public health interventions. Depending on size, location, and amenities, this space can turn into a livelier space that keeps communities psychologically restored and physically active. This is important to ensure that management measures are in place, including distancing measures, safe infrastructure surfaces to reduce contamination, user guidelines on park usage rules, emergency park facility maintenance procedures, emergency fund availability, and others, ensuring safe use.
Physical Justice, Social Justice	Accessibility	From an urban planning perspective, urban public parks and green spaces should be easily and freely accessible in residential areas without any sort of discrimination.	During the pandemic period, access to urban parks was affected by distance, vehicle availability, and park closure policy. Especially in dense neighbourhoods, parks and urban green spaces are rarely located within walking distance. Due to movement restrictions, neighbourhoods that do not have accessible parks within permitted moving distance failed to obtain access to parks. People who do not have their own vehicles experienced reduced green space visitation. In some countries, parks were also temporarily closed to avoid social interaction and control virus contamination.	Park accessibility should be ensured within walking distance where possible. Realising the space- and resource-scarce location, alternative low-cost solutions to park access, e.g., greening footpaths, walking provisions, and green urban sky garden parks, should be considered. Public transport stoppage should add urban green space to ensure easy access.

Table 1. Cont.

Spatial Justice Principles	Broader Planning Principles	Perspective	COVID-19 and Observed Impacts	Lessons for Future Park Design and Management
Right to the city	Participation in decision-making	It emphasises the importance of people's participation in urban park design to make just decisions.	Community members urged for more urban parks within accessible distances that offer variance. Several studies were conducted after COVID-19 outbreak to identify community demands in future park designs.	Community participation in urban greenery and park space is crucial to making the best use of this space. Community members are the ones who are most affected during lockdowns. Integrating their experiences and expectations into future crisis-resilient urban park designs can only provide a diverse, equitable, and liveable green space for city residents.

The revealing collective evidence of COVID-19's effect on the spectrum of urban park usage urges us to make public spaces more vibrant and resilient to future crises. The reported challenges provide room to rethink the potential of urban parks in regard to human well-being and urban ecosystem benefits. In addition to creating more public parks and open spaces in cities to increase exposure to green spaces, studies also suggest adding more features that are beneficial for community resilience and socialisation.

6. Conclusions

This study aimed to investigate the responses of urban parks and green spaces to the evolving needs of city residents during the COVID-19 pandemic. With indoor gatherings posing high risks, these spaces witnessed a surge in visitors seeking a low-risk alternative. Urban parks and green spaces emerged as vital contributors in mitigating the adverse physical and mental impacts of COVID-19, offering a diverse range of ecosystem services and benefits. However, the abrupt onset of the pandemic required prompt responses from local governments and park management authorities to accommodate the increased influx of visitors. Despite implementing numerous ad hoc measures, many urban parks faced challenges adapting to the changed situation. It is high time for decision-makers to decide on sustainable funding sources to support investment in urban green infrastructure. Furthermore, the equitable distribution of benefits among diverse socio-economic, cultural, age, and ethnic groups raised concerns about fair access to urban parks. The support provided by these spaces during the COVID-19 crisis underscored the planning and management challenges they encountered, emphasising the need for a more sustainable, liveable, and responsive approach to urban park planning.

Supplementary Materials: The following supporting information can be downloaded at: <https://www.mdpi.com/article/10.3390/su16103929/s1>. Reference [62] is cited in the Supplementary Materials.

Author Contributions: This research was originally designed and conceptualised by M.S.H.S. Data collection, formal analysis, and original draft preparation was performed by both M.S.H.S. and S.A. J.M. contributed to writing and proof editing. M.S.H.S. conducted the final review, editing, and validation. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Institutional Review Board Statement: Not applicable.

Conflicts of Interest: Author Jeremy Maher was employed by the company Water Corporation. The remaining authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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