

Literatuur Groen-Blauw-Recreatie

Samenvatting alle literatuur

Uit internationale literatuur komt ook naar voren dat men tijdens de coronapandemie meer gebruik heeft gemaakt van groen in de nabije leefomgeving vergeleken met het gebruik hiervan voor de coronapandemie. Daarnaast blijken uit de literatuur dat men over het algemeen meer de buitenomgeving opzoekt en ook meer gebruik heeft gemaakt van de grotere parken en bossen. Hele strenge thuisblijf maatregelen zorgden er, in bijvoorbeeld het Verenigd Koninkrijk en Italië, voor dat men juist minder gebruik heeft gemaakt van de nabije groene leefomgeving en parken.

Naast het gebruik van de nabije groene leefomgeving heeft men in buitenlandse studies ook gekeken naar het effect van groen in de leefomgeving op de fysieke en mentale gezondheid. Hieruit komt naar voren dat er een positieve correlatie is tussen groen in de buurt en het gebruik hiervan en de fysieke en mentale gezondheid tijdens corona. Deze correlatie is wel afhankelijk van de afstand tot deze groene omgeving, hoe groter de afstand des te minder effect het had. Dit geeft aan dat men er goed aan doet om groen in de leefomgeving op te nemen, maar het is wel van belang om hierbij de lagere SES goed in de gaten te houden.

De coronapandemie heeft laten zien dat men meer behoefte heeft aan een groene leefomgeving en dat dit een positief effect heeft op de fysieke en mentale gezondheid van mensen. Bij het inrichten van de leefomgeving doet men er goed aan om groen in de leefomgeving op te nemen, zodat iedereen, zowel mensen uit lage als hoge SES, hier van gebruik kan maken. Terwijl men vroeger met stedelijke ruimtelijke planning vooral gericht was op het beheersen van infectieziekten, zoals cholera, en men nu gericht is op het voorkomen van niet-overdraagbare ziekten, zoals obesitas en diabetes, heeft de coronapandemie laten zien dat we naar een combinatie van deze twee moeten gaan. Een groenere leefomgeving zou beide aan kunnen pakken door een actievere leefstijl te promoten en genoeg ruimte te bieden om tijdens een pandemie transmissie te voorkomen.

UK en Italië en Turkije, minder gebruik van groen → vanwege hele strikte beperkingen, maar daar meer gebruik van tuinen en andere groene gebieden in de zeer nabije leefomgeving

Meer groen geassocieerd met minder mental health klachten en minder symptomen depressie (Lohmus, spano, Dzhambov)

Hunter: sociale ongelijkheden

- *Zie Moore et al (UK) voor interessante inzichten. Urban planning eerst voorkomen infectieziekten, daarna voorkomen preventable ziektes zoals diabetes 2.. nu naar een combi tussen deze twee zoeken.*

Urban planning will do well to enable equitable, easy access to natural settings by foot or bike, to increase pandemic preparedness as well as support climate change mitigation and biodiversity protection.

Nederland

Cloosterman 2021 Running behavior and symptoms of respiratory tract infection during the COVID-19 pandemic

- Of the 2586 included participants, 2427 (93.9%) participants continued running during lockdown with no significant changes in mean weekly training variables.
- The large majority of runners in the Netherlands did not change their running habits during lockdown. No association between running behavior or running habits and onset of symptoms suggestive for COVID-19 was identified. This implicates that running outdoor during lockdown does not negatively affect health of runners

België

da Schio 2021 The impact of the COVID-19 pandemic on the use of and attitudes towards urban forests and green spaces in Belgium

- Urban green spaces (UGS)
- The findings show that highly educated citizens experienced an increase in actual and intended use of green spaces during the pandemic, but that this increase differs among sociodemographic profiles such as impact of age or access to private green, and depends on their local built environment characteristics. In addition, the COVID-19 pandemic has strongly impacted citizens' attitudes, as well as (intended) behaviour and civil engagement with respect to the green spaces in their area.
- Prior to the lockdown, 49 % of respondents visited a UGS more than once a week. During the lockdown, over 80 % of respondents indicated to use a UGS more than once a week. Of these 80 %, 35 % previously indicated using UGS several times a month, 8% indicated using UGS once a month, and 4% indicated using UGS less than once a month
- When asked to reflect on whether they feel the local government should have prioritised UGS before the lockdown, the majority of respondents (58 %) indicated that they felt local government should give UGS "very high" priority (Fig. 3). This increased during the lockdown, with a large majority of respondents indicating that local governments should give UGS "very high" priority (79 %). Most of the change in priority to "very high" occurred for those already giving "medium" (4%) or "high" (22 %) priority to UGS before the lockdown.

Zweden

Beery 2021 Covid-19 and outdoor recreation management

- The public survey (resultaten niet geincludeerd) results reviewed by the outdoor recreation manager participants, showing an increase in outdoor recreation participation, were affirmed by outdoor recreation professionals.
- The increase in users coupled with the perception of new users created concern among interview participants for allemans" att or the universal access laws and traditions. While participants did not note specific problems, a general sense of concern for allemansratt " communication and a potential increased need for allemansratt " outreach was discussed.

Management after the pandemic

- New users: An increase in users and increases in certain activities points to the need for outdoor recreational infrastructure to respond.
- Outdoor recreational infrastructure: With the anticipated ongoing increased use of nature-based outdoor recreation sites, sustainable outdoor recreation infrastructure is needed.
- Nearby nature access and multifunctional landscapes: We have been reminded that people often want or need to recreate close to home—out the door access.

Lohmus 2021 Mental health, greenness, and nature related behaviors in the adult population of stockholm county during covid-19-related restrictions

- Based on 2060 responses from an online survey in Stockholm County, Sweden, we investigated: (1) whether the COVID-19 pandemic changed peoples' lifestyle and nature-related habits, and (2) if peoples' mental health differed depending on their exposure to greenness. Neighborhood greenness levels were quantified by using the average normalized difference vegetation index (NDVI) within 50 m, 100 m, 300 m, and 500 m buffers surrounding the participant's place of residence. We found that the number of individuals that reported that they visited natural areas "often" was significantly higher during the pandemic than before the pandemic. Higher levels of greenness surrounding one's location of residence were in general associated with higher mental health/well-being and vitality scores, and less symptoms of depression, anxiety, and perceived and cognitive stress, after adjustments for demographic variables and walkability

Samuelsson 2021 Visiting nearby natural settings supported wellbeing

Our results strongly suggest that easy access to natural settings supports wellbeing under a "soft-touch" regime of restrictions. We also found evidence that people's wellbeing is negatively influenced by abstaining from visiting areas with high residential density; however, on the whole, population density did not display as strong associations to wellbeing as natural land covers. It is nonetheless still crucial that people keep apart to limit spread of infection. Thus, urban resilience inheres to properties of the spatial system that, among other things, enables access for everyone to natural settings without increased risk of infection. Our spatial analysis further reveals that both high- and low-income neighborhoods are among those who may suffer from poor accessibility of this kind. It is however useful to view the issue as one of environmental justice for all; although some urban residents can afford to travel to faraway natural settings, the public health response to a pandemic may limit even their mobility. Rich and poor alike can gain from efforts to ensure possibilities for visiting natural settings close to home. Urban planning will do well to enable equitable, easy access to natural settings by foot or bike, to increase pandemic preparedness as well as support climate change mitigation and biodiversity protection.

Verenigd Koninkrijk

Burnett 2021 Change in time spent visiting and experiences of green space following restrictions on movement during the COVID-19 pandemic UK

- Overall, 63% of respondents reported a decrease in time spent visiting green space following movement restrictions, compared to 15.2% of respondents who reported an increase in time spent visiting green spaces. Lower social grade respondents were less likely to visit green space before and after restrictions were enforced (OR: 0.35 (95% CI 0.24 to 0.51); OR: 0.77 (95% CI 0.63 to 0.95))

Day 2020 The Value of Greenspace Under Pandemic Lockdown

- Google's COVID-19 Community Mobility Report
- data provided on trips to parks → Google describes: including locations such as national parks, marinas, public beaches, dog parks, plazas and public gardens. Google also comment that the parks data does not include visits to "the general outdoors found in rural areas"
- 23rd March - 10th May visitation (Lockdown) change falls to around 17% of baseline levels.
- Relaxing of lockdown measures around 10th May, coincides with a sharp upswing in parks visitation. On average over that last period of the time series visitation change is around 37% above baseline levels
- Caution with interpretation, baseline is based on (3rd January to 6th February 2020), differences could be due to seasonality (winter vs spring). It would be reasonable to assume that at least part of the differences in visitation seen over this period are attributable to the improving weather.
- A Structural Model of Outdoor Recreation Activity: the ORVal Model

- Using analytical methods that leverage Google Mobility data and the predictive powers of the ORVal model, this paper explores how the COVID-19 lockdown in England changed how people engaged with greenspace and impacted on the economic value they derived from those interactions.
- The lockdown rules forced citizens to get out of their cars and walk.
- Trips to greenspaces by car fell by 47% over the whole lockdown period with an attendant 34% rise in trips taken on foot
- That trend has led to speculation that the COVID-19 lockdown has precipitated widespread “re-engagement” with outdoor recreation and is perhaps evidence of a structural shift in preferences for greenspaces

Geary 2021 Improving urban green spaces to reduce health inequalities exacerbated by COVID-19

Urban greenspaces should be considered not only a public health and social investment but a chance to rebalance our relationship with nature to protect against future pandemics

Johnson 2021 Associations between COVID-19 transmission rates park use and landscape structure

- Using parks, relative to other types of mobility, was associated with a reduction in case rates. Reducing overall mobility (i.e. mobility to all amenity areas) led to a far more substantial decline in case rates. For example, a 20% reduction was projected to reduce cases by c.35%, whilst a 20% increase in park use was projected to reduce cases by 5% to 10%. This suggests that the use of parks may have modestly helped in reducing transmission rates in some areas during the pandemic, but reducing overall mobility is substantially more beneficial than maintaining mobility at prepandemic levels and spending that mobility in parks.

Moore 2022 Rethinking the health implications of society-environment relationships in built areas

- Built environments, particularly cities, have a long legacy of development and renewal in response to outbreaks of infectious disease, including the establishment of open space during the Renaissance to combat bubonic plague in dense urban areas, and urban design to improve waste management in the 20th century (Megahed & Ghoneim, 2020). More recently, urban planners have embraced social science narratives about the links between sedentary lifestyles and health conditions, and the benefits of interactions with natural environments (Wolch et al., 2014). To this end, contemporary shifts in built environments include retrofitting urban areas with ‘green space’ and ‘blue space’ to facilitate wellbeing and physical exercise (Raymond et al., 2016).
- In light of the ongoing COVID-19 pandemic, there is a need to reintroduce planning for contagious disease to the collective psyche of urban planners, policy makers, and wider societies.
- One of the next big challenges for the design and redevelopment of built environments is to tackle the dual risk of emerging contagious diseases, such as COVID-19, on the one hand, and preventing the further escalation of health concerns related to sedentary and other health behaviours on the other. In the context of the current pandemic and transmission mitigation methods, including ‘lockdown’ and physical distancing, there is the danger of exacerbating non-communicable diseases in an effort to control contagion (Hall et al., 2020).
- In the context of highly urbanized regions such as the UK, the focus of urban planning has long since shifted from managing contagion outbreaks associated with poor hygiene and sanitation, such as cholera, to a focus on preventing non-communicable diseases associated with sedentary lifestyles, such as obesity and diabetes. The AHAI captures the dynamics of built environments that influence non-communicable disease and underlying health vulnerabilities. Equivalent ways of analysing landscapes are required that reflect the risks associated with emerging contagious diseases in the 21st century, particularly the

relationship between normative social behaviour, exposure to contagion in social spaces, and high rates of transmission reflected in contagion clusters.

- this is more accurately a challenge of mitigating two pandemics – biological contagion as well as the lifestyle diseases that may become more prevalent as societies progress through uncertain phases of ordinary activity and ‘lock-down’ situations. Urban planning and design may offer some avenues for incentivising active lifestyles while mitigating the transmission of emerging infectious diseases. However, we may also need to reconsider our perception of built environments, and the way we conduct ourselves in those environments.

Spencer 2020 A Scoping Review of How Income Affects Accessing Local Green Space to Engage in Outdoor Physical Activity to Improve Well-Being

- The findings from this scoping review strongly indicate there is an effect of income on using green spaces for PA, but the relationship is erratic and there are many characteristics of the environment, perceived or otherwise, that influence whether an individual engages in PA in local neighbourhood environments or not. This non-sequential relationship between neighbourhood characteristics and perceptions, along with examining the extent that income affects accessing local green space to engage in outdoor PA to improve well-being, requires further investigation. Given the effect of COVID-19 restrictions at local and national levels, the resulting impact on physical and mental health and well-being status has consequences for post-COVID-19.

Italië

De Luca 2021 Accessibility to and Availability of Urban Green Spaces to Support Health and Wellbeing during the COVID-19 Pandemic

- Within this study, we used network analysis to assess UGS proximity, defining four hierarchical levels of UGSs
- The pressure analysis undertaken in this research demonstrated that, even though the northwest area of the city center appear to be well covered by diverse accessible UGSs, most of them are pocket parks and are not able to provide the whole range of CES, such as physical recreation, that wider areas are able to offer.

Spano 2021 Association between indoor-outdoor green features and psychological health during the COVID-19 lockdown in Italy

- A cross-sectional nationwide study involving an online survey was conducted of an Italian population-based sample of 3886 respondents on the association of indoor and outdoor green features (i.e., presence of plant pots, sunlight, green view and accessibility of private green space and natural outdoor environment) with self-reported increases in anxiety, anger, fear, confusion, moodiness, boredom, irritability, recurrent thoughts and/or dreams, poor concentration and sleep disturbance during the COVID-19 lockdown
- Our research has shown that there are associations between indoor and outdoor green features and self-reported change for the most common psychological outcomes related to the COVID-19 lockdown (i.e., anxiety, anger, fear, confusion, moodiness, boredom, irritability, recurrent thoughts and/or dreams, poor concentration, and sleep disturbance).

Ugolini 2021 Usage of urban green space and related feelings of deprivation during the COVID-19 lockdown

- During the lockdown, habits changed significantly: only one third of respondents reported visiting UGS, with frequent visits made mainly for the purpose of walking the dog. Other motivations included the need for relaxing, mostly in the red zones, and for physical exercise in non-red zones. The reduction in travel to urban parks was accompanied by increased

visitation of gardens and other green spaces in close proximity, as social distancing and other regulations imposed restrictions on movement. In all regions, respondents who could not physically access UGS expressed a feeling of deprivation which was exacerbated by living in towns located in red zones, being a usual visitor of UGS and having no green view from the window.

Bulgarije

Dzhambov 2021 Does greenery experienced indoors and outdoors provide an escape and support mental health during the COVID-19 quarantine

- Online survey, 323 surveys from 2 universities in Bulgaria.
- Depressive and anxiety symptoms, greenery experienced indoor, greenery experienced outdoor, quality of the home and neighborhood, engagement with outdoor greenery and perceived social support were treated as mediators.
- In the present study, the mental health of homebound young adults during the COVID-19 pandemic was better if greenery was present. Specifically, the relative abundance of plants/greenery visible from windows/terraces/balconies or in the neighborhood was associated with reduced depressive/anxiety symptoms and lower rates of clinically meaningful depression/anxiety levels. Having more houseplants or having a garden was also associated with some of these markers of mental health.

Table 3
Effects of greenery and mediators on mental health in the structural equation model.

Greenery/mediators	Depressive symptoms ^a		Anxiety symptoms ^a	
	β (95% CI)	p-value	B (95% CI)	p-value
Total effects				
Houseplants	-0.02 (-0.03, -0.01)	<0.001	-0.01 (-0.03, 0.001)	0.071
Green view	-0.02 (-0.07, 0.02)	0.349	0.00 (-0.06, 0.06)	0.972
Garden	0.09 (-0.12, 0.30)	0.412	-0.04 (-0.29, 0.23)	0.795
Neighborhood greenery	-0.07 (-0.12, -0.01)	0.016	-0.09 (-0.15, -0.02)	0.012
Engagement w/ greenery	-0.03 (-0.07, 0.001)	0.057	-0.04 (-0.08, 0.01)	0.085
Being away (home)	-0.07 (-0.11, -0.04)	<0.001	-0.09 (-0.12, -0.05)	<0.001
Restorative quality (neighborhood)	-0.04 (-0.07, -0.02)	<0.001	-0.05 (-0.08, -0.02)	<0.001
Social support	-0.07 (-0.10, -0.04)	<0.001	-0.09 (-0.12, -0.07)	<0.001
Indirect effects				
Houseplants → Being away	-0.004 (-0.01, -0.002)	<0.001	-0.005 (-0.01, -0.002)	<0.001
Green view → Being away	-0.02 (-0.04, -0.01)	<0.001	-0.03 (-0.05, -0.01)	<0.001
Garden → Restorative quality → Engagement	-0.002 (-0.02, 0.01)	0.593	-0.002 (-0.02, 0.01)	0.572
Garden → Restorative quality → Social support	-0.002 (-0.02, 0.01)	0.709	-0.003 (-0.03, 0.02)	0.718
Neighborhood greenery → Restorative quality → Engagement w/ greenery	-0.01 (-0.03, 0.00)	0.047	-0.01 (-0.03, 0.001)	0.075
Neighborhood greenery → Restorative quality → Social support	-0.02 (-0.03, -0.01)	<0.001	-0.02 (-0.04, -0.01)	<0.001

Coefficients are unstandardized linear regression coefficients (β) with their 95% confidence intervals (CI).

^a The variable is square root-transformed.

Polen

Grzyb 2021 Using social media to assess recreation across urban green spaces in times of abrupt change

- We extract data from Instagram, posted at the beginning of the COVID-19 pandemic, for Warsaw, Poland, and use it to measure both the intensity of use of UGS, and the experience of Instagram users. Furthermore, we compare these data with data from the same period for the previous year (2019).
- Used geolocated Instagram posts and their hashtags
- Two main differences; first, there is a shift towards wilder green areas in the case of unwelcome turbulence, and, second, more use is made of wild green areas.
- The wilder, vaster green areas outside the urban core may function as a kind of back-up in more difficult, turbulent times. Other reasons include the fear of becoming infected in parks located in the inner city, which are usually smaller and more crowded than parks and forests in the outer city

Finland

Fagerholm 2021 Outdoor recreation and nature's contribution to well-being in a pandemic situation - Case Turku, Finland

Nearly half of the respondents increased outdoor recreation and the majority of outdoor recreation sites were visited more or as often as before the pandemic. The spatial analysis revealed that the most often visited recreation sites were near forests, semi-natural areas and housing areas as well as relatively close to respondent's residence. Respondents had various reasons for changes in outdoor recreation behaviour. For some a shift to working remotely and changes in everyday routines led to spending time outdoors more often and for some spending less while others avoided recreation in crowded areas due to social distancing. The results also indicate that people's opportunities to adapt to the pandemic conditions differ greatly

Turkije

Gur 2021 Post-pandemic lifestyle changes and their interaction with resident behavior in housing and neighborhoods Turkey

- Lifestyles, housing, residential environments and urban opportunities differ as a result of socioeconomic segregation, and lower-income residents are more vulnerable to disease.
- They reduced their use of the amenities in the city and started using those around their homes, and they adapted their housing to their pandemic lifestyles. However, access to housing, the use of housing, residential environments and urban facilities varied by district.
- Most of the participants stopped using public transport, and half of them changed their shopping habits
- Approximately 60% of the participants said that they have recreational areas or green spaces in or around their homes. Green areas integrated into the city and close to residential areas support people's health, social interaction and physical activity
- The homes of more than half the participants are close to recreational areas, and during the pandemic, their use of their open areas around them increased by about 20%; however, their use of recreational areas decreased during the pandemic.
- The use of urban green spaces declined during the pandemic, but the tendency to use open areas near the residents' homes increased. People with higher incomes have more opportunities in their residential environments, and their physical activities increased during the pandemic, positively affecting their health. In the districts where low-income residents live, the physical and social environment was less well-adapted for physical activity.

Roemenië

Nita 2021 Using Social Media Data to Evaluate Urban Parks Use during the COVID-19 Pandemic

Oostenrijk

Reinwald 2021 Urban Green Infrastructure and Green Open Spaces An Issue of Social Fairness in Times of COVID-19 Crisis

- urban green infrastructure helps in two ways: to adapt to climate change and the challenges posed by COVID-19.
- Improving the urban adaptation capacities is no longer just a matter of climate change, but also of pandemics and, even more so, the combination of challenges from both.
- Hence, the COVID-19 crisis offers the opportunity to force adaptation in two ways. Green infrastructure provides both support in adapting to climate change and to the challenges related to COVID-19
 - o As a first approach, the former strategy of focusing on the specific living environment, including an adequate supply of green and open spaces, should be a

serious model for today [70,71]. The access to private green spaces in case of quarantine or during a lockdown is a decisive factor in terms of socially just distributed housing (and free) space

- A second approach is to renegotiate the distribution of the public space, including the street spaces.
- A third approach is to progressively consider the improvement of physical and mental health through green infrastructure in planning, i.e., the procedural aspect of spatial justice.

Duitsland

Schweizer 2021 Outdoor cycling activity affected by COVID-19 related epidemic-control-decisions

- Based on Strava data
- We found a clear increase in outdoor cycling sport activities in urban public green spaces in response to epidemic-control decisions (e.g. increase by 81% in April relative to the expected value (95% CI [48%, 110%])). In contrast, biking in rural areas showed no significant change with epidemic-control-decisions in place.

Weinbrenner 2021 The Critical Importance of Urban Forests During the COVID-19 Pandemic

- We found a dramatic increase in forest visits. People went into forests more often and for longer periods of time during the lockdown. Even people who did not use forests before the COVID-19 related restrictions started doing so. Thus the importance of the urban forests around the city of Freiburg has increased during the COVID-19 pandemic.

Noorwegen

Venter 2020 recreational use of green space increases during the COVID-19 outbreak in Oslo Norway

- Using mobile tracking data from thousands of recreationists in Oslo
- We estimated that outdoor recreational activity increased by 291% during lockdown relative to a 3 yr average for the same days. This increase was significantly greater than expected after adjusting for the prevailing weather and time of year and equates to approx. 86 000 extra activities per day over the municipality (population of 690 000)
- Both pedestrians (walking, running, hiking) and cyclists appeared to intensify activity on trails with higher greenviews and tree canopy cover, but with differences in response modulated by trail accessibility and social distancing preferences. The magnitude of increase was positively associated with trail remoteness, suggesting that green spaces facilitated social distancing and indirectly mitigated the spread of COVID-19. Finally, pedestrian activity increased in city parks, peri-urban forest, as well as protected areas, highlighting the importance of access to green open spaces that are interwoven within the built-up matrix

Venter 2021 Norwegians sustain increased recreational use of urban green space months after the COVID-19 outbreak

- We used mobile tracking data from 53,000 STRAVA users to explore the longevity of increases in recreational activity.
- Recreational activity increased by 240% during the five weeks of comprehensive lockdown and were maintained until the summer vacation period in June/July when they dropped to baseline levels.
- during August they increased again to 89% above baseline.
- Although activity increased across all city land use zones, after lockdown there was a shift away from residential and commercial zones toward city green spaces including forests and protected areas. Cultural landscapes and protected areas received disproportionately high activity levels relative to the length of recreational trails available within them.

- The COVID-19 pandemic and its disruptions to the status quo has had lasting effects over the short-term on the way Norwegian citizens recreate. Our findings reinforce the value of urban nature and open spaces for societal pandemic preparedness, particularly youths, during and after times of crisis.

Australië

Astell-Burt 2021 Inequities in Green and Blue Space Access Visitation and Felt Benefits

- Social Research Centre's Life in Australia™ panel between 12 and 26 October 2020
 - Visit Green/Blue Spaces More Often Now than before COVID
 - o 27.6 (25.5, 29.9) (% Yes (95% CI))
 - afhankelijk van economic sate en "nature-relatedness scores".
 - Increased levels of visitation did not appear to be associated with measures of socioeconomic circumstances.
- | | | |
|--|-------------------|-------------------|
| Economic status (ref: Employed, not working from home) | 24.4 (20.4, 28.7) | |
| Employed, working from home sometimes | 27.6 (21.5, 34.6) | 1.20 (0.84, 1.67) |
| Employed, working from home often | 30.4 (23.2, 38.7) | 1.52 (1.02, 2.16) |
| Employed, working from home always | 47.8 (41.4, 54.3) | 2.01 (1.46, 2.71) |
| Unemployed | 28.7 (20.9, 38.1) | 1.05 (0.67, 1.54) |
| Retired | 19.4 (16.3, 22.9) | 1.14 (0.74, 1.69) |
| Long-term sick or disabled | 13.3 (7.1, 23.7) | 0.86 (0.39, 1.58) |
- Green Spaces and/or Blue Spaces Have Helped Me to Stay Connected during the Pandemic
 - o 25.7 (23.7, 27.9) (% Yes (95% CI))
 - Green Spaces and/or Blue Spaces Have Brought Me Solace and Respite in These Challenging Times
 - o 53.7 (51.3, 56.1)
 - I Now Walk and/or Exercise in Green Spaces and/or Blue Spaces More Often than Before COVID
 - o 28.2 (26.0, 30.5)
 - I Have Discovered and Visited Green/Blue Spaces That I Had Not Visited Before the Pandemic
 - o 27.1 (24.9, 29.5)
 - People who were able to work from home reported more frequent levels of visitation, longer cumulative visit times, visits to a greater variety of settings, discovery of green and/or blue spaces they had not previously encountered, and felt those visits enabled more frequent exercise and supported feelings of solace and respite, in comparison to those unable to work from home and independent of confounding factors such as income and education
 - no evidence was found to indicate that Melbourne residents—who were in an extended 'lockdown' during the survey—were disadvantaged in terms of access, visitation and felt benefits from green and/or blue space relative to counterparts living in Australia's four other most populous cities
 - people with greater socioeconomic disadvantage, such as those experiencing financial difficulty, were less likely to visit green and blue spaces during the COVID-19 pandemic.

Berdejo-Espinola 2020 Urban green space use during a time of stress

- About 36% of participants increased their urban green space use, but 26% reduced it, indicating a great deal of flux. Furthermore, 45% of the previous nonusers of urban green space began using it for the first time during the restrictions period.
- Across all participants, 12.8% (n = 129) used urban green spaces daily before the restrictions period, but this increased to 19.2% (n = 193) during the restrictions period.
- Participants' change in use occurred regardless of the amount of green space available in close proximity to their households. In addition, we did not find a relationship between nature-relatedness and change in use

- People's reasons for green space use shifted during the pandemic-related restrictions period, with many emphasising improvement of personal well-being rather than consolidating community capital. Most participants indicated an increase in the importance of the psychological and physical benefits obtained from urban green spaces.

Gunn 2020 Can a liveable city be a healthy city, now and into the future

- Research evidence finds that the way cities are planned and built can influence the behaviours and physical⁴ and mental health^{5,6} of those living within them
- Living locally is encapsulated by the Victorian government's 20 min neighbourhood initiative in Australia,¹² which follows similar government plans globally that seek to bring people closer to a variety of destinations within a turnaround time of 20 min, or within an 800 m distance.¹³
- Cities around the world are drawing on Sustainable Urban Mobility Plans to assist in the early delivery of cycle lanes and pedestrian prioritised spaces in an effort to provide alternative transportation options that mitigate COVID-19 virus transmission.

Amerika

Beck 2021 A Cross-Sectional Comparison of Physical Activity during COVID-19 in a Sample of Rural and Non-Rural Participants in the US

- Physical activity (PA) pre-COVID-19 was lower in rural areas compared to non-rural areas. The purpose of this study was to determine COVID-19's impact on PA in rural and non-rural residents.
- There was no difference in the perception of COVID-19's impact on PA, specifically; however, rural participants were significantly less likely to meet cardiorespiratory PA recommendations compared to non-rural participants. Conclusions: This study demonstrates the continued disparity in PA between rural and non-rural residents, despite the supposition of COVID-19 being less impactful in rural areas due to sparse populations

Frank 2021 Treating two pandemics for the price of one

- Obesity is significantly and inversely related with residential density and walkable urban design.
- Obesity mediates the relationship between the built and natural environment and COVID-19 mortality.
- Built environment relationships with obesity and COVID-19 are systematically different across income and ethnicity. The most vulnerable populations have much higher rates of obesity and
- COVID-19 mortality and these differences are partially explained by the environments in which they live.
- Strong and statistically significant negative correlations between built/natural environment and COVID-19 fatality rate were found after controlling for unobserved factors and demographics.
- Tree canopy and green space is associated with lower COVID-19 mortality rates.
- Population density was positively associated with COVID-19 incidence rates.

Heo 2020 Relationships between Local Green Space and Human Mobility Patterns during COVID-19 for Maryland and California

- the decline of mobility during the COVID-19 pandemic appeared to be lower in regions with green space such as state parks in Maryland and local parks in California.
- Nonetheless, the potential impact of green space on mobility during a pandemic shown in our study and other recent literature [7,31,32] implies the need for future design and

planning for green space and open spaces where disease control measures such as physical distancing can be performed during an outbreak [31,44,45].

Hunter 2021 Effect of COVID-19 response policies on walking behavior in US cities

- we integrate mobility data from mobile devices and area-level data to study the walking patterns of 1.62 million anonymous users in 10 metropolitan areas in the United States. The data covers the period from mid-February 2020 (pre-lockdown) to late June 2020 (easing of lockdown restrictions).
- Dramatic declines in walking, particularly utilitarian walking, while recreational walking has recovered and even surpassed prepandemic levels.
- We show that COVID19 response measures had a larger impact on walking behavior for those from socially disadvantaged areas, with larger fractions of public transportation users, worse obesity indicators, and a physical environment that is less conducive to walking. On the contrary, high-income areas have substituted utilitarian walking activity for more leisure walking, sometimes reaching even higher levels of walking than before the pandemic.

Jackson 2021 Outdoor Activity Participation Improves Adolescents' Mental Health and Well-Being during the COVID-19 Pandemic

- Paired t-tests revealed decreases in both outdoor recreation participation (64% reported declines) and subjective well-being (52% reported declines). A regression model examining correlates of changes in subjective well-being ($R^2 = 0.42$) revealed strong associations with changes in outdoor play ($B = 0.44$, $p < 0.001$) and nature-based ($B = 0.21$, $p = 0.016$) activities. Adolescents' from all backgrounds who participated in these activities during the pandemic reported smaller declines in subjective well-being.

Klompaker 2020 County-level exposures to greenness and associations with COVID-19 incidence and mortality in the United States

- Normalized Difference Vegetation 57 Index (NDVI)
- An increase of 0.1 in NDVI was associated with a 6% (95% Confidence Interval: 3%, 10%) decrease in COVID-19 incidence rate after adjustment for potential confounders. Associations with COVID-19 incidence were stronger in counties with high population density and in counties with stay-at-home orders. Greenness was not associated with COVID-19 mortality in all counties; however, it was protective in counties with higher population density.

Landry 2021 How Has the COVID-19 Pandemic Affected Outdoor Recreation in the US

- results suggest that the pandemic had negative effects on recreation visits and values, with risk-tolerant households and households with pre-existing conditions taking more trips.
- Our results indicate an approximately 26% reduction in trips per participant to public outdoor recreation sites post-COVID-19, as compared to pre-COVID-19 trips. Our results also showed a decrease in annual consumer surplus per outdoor recreation participant of about 19% (averaged across all models) or 26% (for preferred model), which can be attributed to post-COVID-19 reductions in site quality related to COVID-19 perceived risks and restrictions.
- This reduction in quality resulted in an estimated reduction in consumer surplus per-outdoor-recreation-participant of about \$424 annually.

Lanza 2021 Use of Joint-Use Parks by Children before and during COVID-19 Pandemic

- Results of negative binomial regression modeling revealed the pandemic was associated with a 46% [95% CI: 20–63%] and 62% [95% CI: 39–76%] decrease in the number of girls and boys at parks, respectively, and a 42% [95% CI: 16–59%] and 60% [95% CI: 36–75%] decrease in the number of girls and boys engaging in physical activity, respectively ($p < 0.01$). In total,

60.6% of girls and 73.6% of boys were not social distancing, and 91.8% of the time no children wore masks. Interventions should be considered to safely reintroduce children to parks for health benefits during pandemics.

Larson 2021 Greenspace and park use associated with less emotional distress among college students in the United States during the COVID-19 pandemic

- We found that 67% of students reported limiting outdoor activities and 54% reported reducing park use during the pandemic. Students who reduced their use of outdoor spaces cited structural reasons (e.g., lockdowns), concerns about viral transmission, and negative emotions that obstructed active lifestyles. Students who maintained pre-pandemic park use levels expressed a desire to be outdoors in nature, often with the explicit goal of improving mental and physical health. Emotional distress among students was widespread. Models showed higher levels of emotional distress were associated with reducing park use during the pandemic and residing in counties with a smaller area of parks per capita. This study of U.S. college students supports the value of park-based recreation as a health promotion strategy for diverse populations of young adults during a time of crisis

Lopez 2021 Who benefits from urban green spaces during times of crisis

- most respondents were concerned about a lack of social distancing and crowded UGS, and respondents with these concerns were less likely to visit UGS and had visited UGS less often during than before the pandemic. In addition, generalized linear models showed differences in some concerns and important features of UGS across gender, race and ethnicity, demonstrating the importance of considering specific community needs in UGS design and management. Although concerns about lack of access were not common in our study population, these also appeared to prevent people from using UGS, and were more common in certain areas of the city that were also hard-hit by COVID-19 in the beginning of the pandemic.
- To ensure that people can get health benefits from UGS during times of crisis, cities must eliminate barriers by providing equitable access to UGS, considering what amenities communities need from UGS, and provide consistent communication about public health policies.

Midway 2021 COVID-19 influences on US recreational angler behavior

- Anglers reported numerous effects of the pandemic, including fishing access restrictions. Despite these barriers, we found that the amount of fishing in the spring of 2020 was significantly greater—by about 0.2 trips per angler—than in non-pandemic springs. Increased fishing is likely associated with our result that most respondents considered recreational angling to be a COVID-19 safe activity. Nearly a third of anglers reported changing their motivation for fishing during the pandemic, with stress relief being more popular during the pandemic than before. Driven partly by the perceived safety of social fishtancing, recreational angling remained a popular activity for many US anglers during spring 2020

Pipitone 2021 Urban green equity and COVID-19

- While the level of satisfaction that people feel in relation to their UGS did not change with the onset of the pandemic, how much people use these spaces and how much they “feel at home” in them did. Participants reported higher use of UGS currently in comparison to their use of these spaces pre-pandemic. This increased use of UGS was particularly evident among White participants and participants living in more uppermiddle- and upper-income areas.

Restrepo 2021 Nitrogen dioxide, greenhouse gas emissions and transportation urban

- As cities begin to reopen economic activity they should not rush to reverse the measures taken to restrict traffic and repurpose street spaces. Instead, they should carefully monitor and evaluate the impact of such measures on air quality and their potential for greenhouse gas emissions mitigation. These policies could help cities achieve multiple goals related to environmental and social sustainability.

Rice 2020 Changes in recreational behaviors of outdoor enthusiasts during the COVID-19 pandemic

- While results of this study indicate that the behaviors of outdoor enthusiasts—despite the size of their community of residence—have changed in response to the COVID-19 pandemic, those from urban areas are significantly more impacted than those from urban clusters or rural areas. These results confirm the hypothesis of Samuelsson et al. (2020)—that travel and physical distancing restrictions are impacting recreation patterns of urban populations, who are generally bound by the tightest restrictions (Tufan and Kayaaslan 2020).
- decreases in distance travelled to participate in outdoor recreation—significantly greater among urban area residents—suggest that visitors are substituting more proximate recreational settings for more preferable, distant settings.

Tomasso 2021 The relationship between nature deprivation and individual wellbeing across urban gradients under covid-19

- We measure through on-line survey methods (n = 529) how pandemic mandates limiting personal movement and outdoor nature access within the United States affect self-assessed nature exposure, perceived nature deprivation, and subsequent flourishing as measured by the Harvard Flourishing Index.
- Our hypothesis is that individuals with strong perceived nature deprivation under COVID-19 leads to diminished wellbeing proved true
- Our main findings support both our hypotheses that (1) changes to nature exposure identified at the indoor, neighborhood, and municipal levels related to self-expressed nature deprivation under the COVID-19 pandemic, with those who spent the same or more time in nature under shelter-in-place feeling significantly less deprived after accounting for sociodemographic variables and stringency of pandemic restrictions on personal mobility and public nature access; and (2) individuals who felt nature deprived under shelter-in-place experienced reduced flourishing at high statistical significance, controlling for job and household factors.

Volencic 2021 How park usage has been affected by COVID-19 policies

- We compare park usage during four discrete stages of spring 2020: (1) before the pandemic began, (2) during the beginning of the pandemic, (3) during the New Jersey governor's state-wide park shutdown order, and (4) following the lifting of the shutdown
- We find that park visitation increased by 63.4% with the onset of the pandemic. The subsequent park shutdown order caused visitation in closed parks to decline by 76.1% while parks that remained open continued to experience elevated visitation levels. Visitation then returned to elevated pre-shutdown levels when closed parks were allowed to reopen.

Japan

Hino 2021 Change in walking steps and association with built environments during the COVID-19 state of emergency

- This longitudinal study analyzed the step counts of 18,817 citizens in Yokohama city in the first half of 2020 compared to the previous year, and investigated the association between the change in step counts and the individuals' neighborhood environment by sex and age using generalized linear mixed models. Step counts decreased especially in women and non-elderly people during the SoE. Older women were more susceptible to the neighborhood

environment: high walkability (i.e., high population density, proximity to railway stations) adversely affected their step counts, whereas proximity to large parks came to have a positive effect during the SoE.

Yamazaki 2021 Use of Urban Green Spaces in the Context of Lifestyle Changes during the COVID-19 Pandemic in Tokyo

- An online questionnaire survey was conducted among Tokyo residents, and 3085 responses were obtained
- The results showed that older adults and families with children who had been using UGS before the pandemic and telecommuters who newly started using UGS during the pandemic used UGS differently. Older adults and families with children tended to use small parks and appreciated human connections. Telecommuters often used greenways, temples, and shrines, valuing stress-reducing functions.

Indonesië

Hriyani 2021 A pandemic response to the issues of inclusivity and accessibility in green open spaces

- The implementation of accessibility during the pandemic cannot be worked thoroughly, mainly due to rules of physical distancing and the Covid-19 operational standards. But still we can use the several key aspects for a pandemic respond is engineering and designing on the use of space and time at public green open spaces, such as innovative design on its elements (bench, pathway, jog track, etc.).

China

Huang 2020 Investigating the Relationship between the Built Environment and Relative Risk of COVID-19 in Hong Kong

- The results indicate that COVID-19 risk tends to be concentrated in particular areas of Hong Kong. Using the incidence rate as an indicator to assess COVID-19 risk may underestimate the risk of COVID-19 transmission in some suburban areas. The GPR and GWPR models suggest a close and spatially heterogeneous relationship between the selected built-environment variables and the risk of COVID-19 transmission. The study provides useful insights that support policymakers in responding to the COVID-19 pandemic and future epidemics. The risk of COVID-19 is assessed using the incidence rate (R1) and venue density (R2).

Kan 2021 Identifying the space-time patterns of COVID-19 risk and their associations with different built environment features in Hong Kong

- The results indicate that high transport accessibility, dense and high-rise buildings, a higher density of commercial land and higher land-use mix are associated with a higher risk for places visited by confirmed cases. More green spaces, higher median household income, lower commercial land density are linked to a higher risk for the residences of confirmed cases. The results in this study not only can inform policymakers to improve resource allocation and intervention strategies but also can provide guidance to the public to avoid conducting high-risk activities and visiting high-risk places.

Li 2020 Associating COVID-19 Severity with Urban Factors

- This research may contribute toward developing specific planning and design responses for different areas in the city based on a better understanding of the occurrence, transmission, and diffusion of the COVID-19 epidemic in the metropolitan area.

Liu 2021 Associations between changes in population mobility in response to the COVID-19 pandemic and socioeconomic factors at the city level in China and country level worldwide

- The reduction in intra-city movement intensity in China was stronger in cities with a higher SEI than in those with a lower SEI ($r=-0.47$, $p<0.0001$). However, reductions in inter-city movement flow (both inflow and outflow intensity) were not associated with SEI and were only associated with government control measures.

Yang 2021 Urban greenery cushions the decrease in leisure-time physical activity during the COVID-19 pandemic

- The results of difference-in-differences model suggest that urban greenery mitigated the decrease in physical activity during the pandemic. People who lived in greener neighborhoods experienced a lesser decrease in the leisure-time physical activity level than those who lived in less green neighborhoods. Additionally, people who lived in greener neighborhoods experienced increased levels of physical activity related to visits to country parks during the pandemic. These findings suggest that urban green spaces play a significant role in shaping physical activity and providing a refuge for the public during crises. Our study is among the first to investigate the impact of urban greenery on pandemic-induced changes in leisure-time physical activity in densely populated Asian cities, and our findings shed light on the potential protective role of urban greenery on public health during the COVID-19 pandemic and beyond.

Ye 2021 Using urban landscape pattern to understand and evaluate infectious disease risk

- Low fragmentation and natural large-scale ecological patches scale are important for infection risk prevention in cities. To deal with possible future infection risk, natural ecological patches should be preserved in suburban sub-districts through appropriate urban planning, and the protection of urban blue-green spaces should be increased in the city center. Reducing population density by limiting development intensity, weakening mobility and connectivity through closure policies, and improving the ecological environment with urban blue-green spaces (large wind corridors) are three aspects in urban planning for normal infectious disease prevention.

Zhang 2022 Effects of tree canopy on psychological distress before and during the COVID-19 pandemic

- The negative impact of the COVID-19 epidemic on mental health was significant, with the prevalence of psychological distress increased 7.84 times (aOR = 7.84, 95% CI = 4.67–13.95) during the COVID-19 epidemic period. Tree canopy coverage in the group without psychological distress was significantly higher than that of the psychologically distressed group ($31.07 \pm 11.38\%$ vs. $27.87 \pm 12.97\%$, $P = 0.005$). An increase in 1% of TCC, was related to a 5% decrease in the prevalence of psychological distress (aOR = 0.95, 95% CI = 0.93–0.98). An antagonism joint action between tree canopy and the COVID-19 epidemic existed (RERI = 1.09, 95% CI = 0.72–1.47; SI = 0.16, 95% CI = 0.05–0.52), and persisted enhancing only in medium (26.45%–33.21%) and above TCC level. Correlation of GHQ items and TCC significantly differed between the COVID-19 non-epidemic and epidemic periods, with the effects of tree canopy on GHQ-12 items covering topics, such as social function and depression, presumably absent because of epidemic limitations.

Mexico

Huerta 2021 Evaluating the association between urban green spaces and subjective well-being in Mexico city during the COVID-19 pandemic

- This paper examines the association between the frequency of use of urban green spaces (UGS) and the subjective well-being (SWB) of Mexico City's residents during the COVID-19 pandemic. We conducted an online survey (N = 1954)

- Our results suggest that respondents who used UGS once or more per week during the pandemic reported higher SWB scores (8.7%) than those with zero visits. These findings have public policy implications that could enhance the role of UGS in urban environments during times of crisis.
- our results suggest that regular exposure to UGS (once or more than once a week) has a positive association with SWB. These findings provide confirmation that using UGS often may be a path for the promotion of better SWB outcomes not only in the pandemic context but also under more normal conditions
- UGS use declined following the onset of the pandemic. The closure of parks and occupancy rate limitations likely influenced this decline, affecting people's behaviors (Kleinschroth and Kowarik, 2020). Additionally, mobility restrictions and contagion fears could impact how far people are willing to travel to visit UGS (Mayen Huerta and Cafagna, 2021).
- The study's findings suggest that frequent use of UGS can be considered a path to promote public health and increase self-reported SWB, particularly during a pandemic.

Rusland

Kontsevaya 2021 Changes in physical activity and sleep habits among adults in Russian Federation during COVID-19

- The sample included 2432 participants from 62 regions, 83% of who were female. There was a significant decline in the number of days per week participants reported not getting enough sleep (3.21 ± 2.44 to 2.86 ± 2.57 ; $P < 0.001$); participants also reported an increase in the number of days per week they had trouble falling asleep (1.70 ± 2.24 to 2.13 ± 2.48 ; $P < 0.001$). The proportion of participants who met the WHO Guidelines for PA declined from 68 to 49% ($P < 0.001$). The proportion who participated in muscle strengthening activities for 2 or more days per week declined from 53 to 45% ($P < 0.001$).

Israel

Kozer 2021 Presence of SARS-CoV-2 RNA on playground surfaces and water fountains

- Two of the 43 (4.6%) samples from playground equipment and one (4%) sample from a drinking fountain tested positive.

Meerdere landen

Dushkova 2021 5.1.2e of Urban Blue and Green Infrastructure during a Pandemic

- Using results from a web-based questionnaire survey conducted May–July 2020 in **Moscow (Russia) and Perth (Australia)**, this paper provides insights regarding citizens' needs for and values of urban blue and green infrastructure (BGI) as well as their changes during and after the COVID-19 restrictions.
- Survey data collected during the lockdown period have captured information about people's ability to access green and blue spaces within urban BGI, inequalities in access, feelings, and values as well as needs and perceived pathways of future development of urban natural environment.
- BGI includes publicly accessible and private green space, natural green space (remnants of native vegetation which experience different intensities of human intervention and where some or all endemic ecosystem processes are affected) as well as specifically designed BGI includes publicly accessible and private green space, natural green space (remnants of native vegetation which experience different intensities of human intervention and where some or all endemic ecosystem processes are affected) as well as specifically designed
- That is, the features of a sustainable and resilient city should not only relate to fulfilling economic and social urban strategies, but also to the design and management of urban BGI in order to address current and future societal challenges.

- In both cities, the most frequently selected activity to cope with COVID-19 restrictions was taking a walk outside (72.7% Perth and 50.5% Moscow). Physical exercise (either outdoors or indoors) was identified as one of the most important coping strategies in both cities.
- All respondents in both cities highly valued urban green and blue spaces for physical and mental well-being.
- Most respondents reported they would not change their green and blue spaces visit frequency and most of them (75.2% in Perth and 65.7% in Moscow) would return to regular pre-pandemic frequency of visits. However, more than a quarter of Muscovites (28.2%) and a fifth of Perth residents (20.8%) reported they would increase their visits to green and blue areas.

Geels 2022 Moving beyond opportunity narratives in COVID-19 green recoveries

- Our empirical contribution is to analyse actual green recovery spending plans of three leading countries (**France, Germany, and the UK**), focusing on the size, sectoral allocation, and implementation choices, which differ markedly
- France spends the most, both in absolute and GDP-relative terms, followed by Germany. UK spending is 43% less than France. The UK and France mostly support existing sectors (buildings, railways), while Germany focuses 57.8% of its funding on new technologies (electric vehicles, hydrogen).

Geng 2020 Impacts of COVID-19 pandemic on urban park visitation

- **48 countries and regions**
- Park visitation increased compared with a baseline developed before the outbreak began. Restrictions on social gathering, movement, and the closure of workplace and indoor recreational places, are correlated with more visits to parks. Stay-at-home restrictions and government stringency index are negatively associated with park visits at a global scale. Demand from residents for parks and outdoor green spaces has increased since the outbreak began, and highlights the important role and benefits provided by parks, especially urban and community parks, under the COVID-19 pandemic.
- Our findings suggest that the demand for access to parks and outdoor green spaces increased during the pandemic

Haase 2021 COVID-19 pandemic observations as a trigger to reflect on urban forestry in European cities under climate change

- urban forests in European cities
- During the 2020/2021 COVID-19 pandemic, urban forests and trees as nature-based solutions in cities received unexpectedly enhanced interest, as people in Europe—used to travel to the mountains or the sea for recreation and holidays—were confined to their homes, and going outside—be it in their neighbourhood or to a nearby park—was the only refuge for many people (da Schio et al., 2020)
- During the lock- and shutdowns but also afterwards, green spaces in general were found to be more important and more attractive for urban citizens across all age groups compared to pre-pandemic times (Barton et al., 2020).
- During the unstable pandemic phases since spring 2020, the importance of urban forests and urban trees in people's lives in cities has increased (Ugolini et al., 2021).
- Groen in de stad levert ook mogelijke problemen – human and vectors closer together etc
- Groen in de stad: Hybridity, succession, and flexibility
 - o Hybridity – we need co-habiting green infrastructure and urban nature in our future cities, but not at the same place (we need some untouched nature), and explicitly including urban forests and trees
 - o Succession – Cities need spaces such as brownfields where urban successive wilderness can emerge and grow in an undisturbed way that is unmanaged by

- humans and thus explicitly non-designed. Here, urban nature can experiment, develop site-specific diversity (Baldock et al., 2019) and learn to adapt to whatever conditions cities provide and face
- Flexibility for active non-action
 - For urban planning, there are three core implications that can be derived from this argumentation:
 - Planners need to consider longer time periods for the implementation of nature-based solutions to let them develop including failure.
 - Planning must include nature determinism in green infrastructure design which means allowing nature to adapt to higher temperature and less rainfall and this way learn from nature what could be urban green solutions under changed climate
 - Planners should create space for both humans and nature in cities but also provide spaces exclusively for nature to let it adapt, success and develop less disturbed by humans.

Jauregui 2021 Scaling up urban infrastructure for physical activity in the COVID-19 pandemic and beyond

- During the COVID-19 pandemic, there have been declines in physical activity worldwide,⁷ highlighting the need for widespread, accessible, and safe public open spaces for active recreation and infrastructure for active transportation in cities.
- Because of covid → implementing rapid, large-scale urban transformations to increase access to public open spaces and active transport infrastructure. Two examples are **Sydney, Australia, and Mexico City, Mexico**. In both cities, several kilometres of pop-up, protected cycle lanes were rolled out since mid-2020; local authorities have reported increases in cycling and strong public support for this approach.^{12,13} Sydney and Mexico City have announced plans to maintain the new cycling infrastructure permanently or develop acceptable long-term alternatives.^{12,13}

Kraus 2021 Provisional COVID-19 infrastructure induces large, rapid increases in cycling

- During the COVID-19 crisis, governments have therefore incentivized cycling by provisionally redistributing street space.
- We scrape daily bicycle counts from 736 bicycle counters in **106 European cities**. We combine these with data on announced and completed pop-up bike lane road work projects. Within 4 mo, an average of 11.5 km of provisional pop-up bike lanes have been built per city and the policy has increased cycling between 11 and 48% on average. We calculate that the new infrastructure will generate between \$1 and \$7 billion in health benefits per year if cycling habits are sticky

Liu 2021 Reexamine the value of urban pocket parks under the impact of the COVID-19

- available green space is further reduced when some parks are closed or open with limited functions to reduce the spread of coronavirus. At the same time, the demand for green space has increased because of the unavailability of other activities.
- we call the attention of urban planners and designers to pocket parks. Studies have shown that the tiny size of pocket parks makes them an easier fit into vacant properties scattered throughout the urban fabric. Therefore, pocket parks can improve health and encourage social cohesion of residents in often underserved high density urban neighborhoods. The potential of pocket parks in providing accessible urban green space to all urban population may have been considered desirable before the coronavirus outbreak and now it should be considered a necessary 'lifeline' to improve urban residents' health during the coronavirus.

In addition, with the long-overlooked value of accessible urban green space waken by the global-scale crisis, proper attention and improvement strategy, such as introducing more pocket park could lead to a better future after the COVID-19.

Nieuwenhuijsen 2021 New urban models for more sustainable, liveable and healthier cities post covid19

- different cities
- We provide a narrative meta-review around a number of cutting edge and visionary urban models that that may affect health and that have been reported over the past few years.
- New urban concepts such as the Superblocks, the low traffic neighbourhood, 15 Minute city, Car free city or a mixture of these that may go some way in reducing the health burden related to current urban and transport practices. They will reduce air pollution and noise, heat island effects and increase green space and physical activity levels. What is still lacking though is a thorough evaluation of the effectiveness and acceptability of the schemes and the impacts on not only health, but also liveability and sustainability, although they are expected to be positive. Finally, the COVID19 pandemic may accelerate these developments and stimulus funding like the EU Next Generation funding should be used to make these changes.
- Alle “nieuwe cities” hebben een aantal dingen gemeen
 - o Change in focus → city for cars turns into city for people (public transport, walking and cycling)
 - o Improve access to green space

Slater 2020 Recommendations for Keeping Parks and Green Space Accessible for Mental and Physical Health During COVID-19 and Other Pandemics

- In this commentary, we propose some solutions that can be implemented, now or in the future, to provide access to green space while allowing physical distancing.
- Short term recommendations
 - o Keep parks open. For both urban and rural areas, state and local parks with trails and open green space should remain open. Modifications in scheduling might be needed to help control the number of visitors at one time and allow for appropriate physical distancing.
 - o Modify policies on the use of public transit. During shelter-in-place orders, maintain transit routes to parks and green space.
 - o Adopt open streets or slow streets initiatives
 - o Adopt consistent messaging
- Long term recommendations
 - o Create built environments for all users. Infrastructure plans should include policies and plans for creating healthy environments, such as Complete Streets, Safe Routes to Parks, Safe Routes to Schools, and mixed-use policies (20,24). Plans should also intentionally include green space and public spaces for leisure and recreation.
 - o Consider where to locate parks and green spaces
 - o Conduct ongoing monitoring and evaluation

Wang 2021 Review of Associations between Built Environment Characteristics and Severe Acute Respiratory Syndrome Coronavirus 2 Infection Risk

- Virus infection risk was positively associated with the density of commercial facilities, roads, and schools and with public transit accessibility, whereas it was negatively associated with the availability of green spaces.