



## COVID-19 gardening could herald a greener, healthier future

The world is currently experiencing major public health and socioeconomic crises, as COVID-19 impacts the way we live, work, and interact (Lambert *et al.* 2020). Lockdowns and social distancing have largely disrupted our daily lives, in ways that might have adverse and unanticipated effects on physical and mental health (Alonzi *et al.* 2020). This pandemic comes at a time when people are already undergoing more subtle and yet substantial changes through the progressive and chronic deterioration of human-nature interactions due to urbanization and modern lifestyles (Soga and Gaston 2016; Truong and Clayton 2020). The loss of nature interactions can have severe physical and mental health impacts through the reduction of social and recreational opportunities, incidental or planned exercise, or relaxation activities (Hartig *et al.* 2014).

Gardening has the potential to counteract these impacts, especially during the COVID-19 pandemic. Contemporary gardens are varied, and range from private yards to balconies to community gardens or common land, and even include roadside verges (plantings along road edges). Prior research on gardening has shown that in any of these spaces gardening can generate multiple benefits for physical, mental, social, and cognitive health (Soga *et al.* 2016; Howarth *et al.* 2020). Despite factors such as housing density and sociodemographic context – which can affect access to space for gardening – gardens may be the most accessible greenspace available during COVID-19 lockdowns (Schupp *et al.* 2016; Poortinga *et al.* 2021; Theodorou *et al.* 2021). Whether in a person's own yard, on their windowsill, or within their neighborhood, these spaces provide a place where people can engage and physically interact with nature (Lin *et al.* 2018). This letter aims to explore if people have taken a renewed interest in gardening during the COVID-19 pandemic

and to stimulate a conversation that fosters long-term and systemic interest in creating greener and healthier communities.

Many media outlets reported spikes in gardening interest during the early months of the COVID-19 pandemic, showcasing images of empty shelves of sold-out seeds and plants in many gardening stores (Timmins 2020; Walljasper and Polansek 2020). To understand how widespread the global interest for gardening was during the initial infection waves of COVID-19, we examined the relationship between the date of first-wave infection peaks in 39 countries with the date when online interest for gardening peaked in each country (based on publicly available Google Trends data and compared to data from the previous years). These countries differ in not only population size but also socioeconomic background, and are located in various climatic regions. However, these countries represent approximately 81% of the global COVID-19 reported infections (on 22 Oct 2020) with clear initial COVID-19 infection peaks at different times of the year. We found that the pattern in gardening interest was strongly synchronized with the first-wave infection peaks of the COVID-19 pandemic (Figure 1;  $F = 64.29$ ,  $R^2 = 0.64$ ;  $P < 0.001$ ), showing strong cross-country interest in gardening as lockdowns became more widespread.

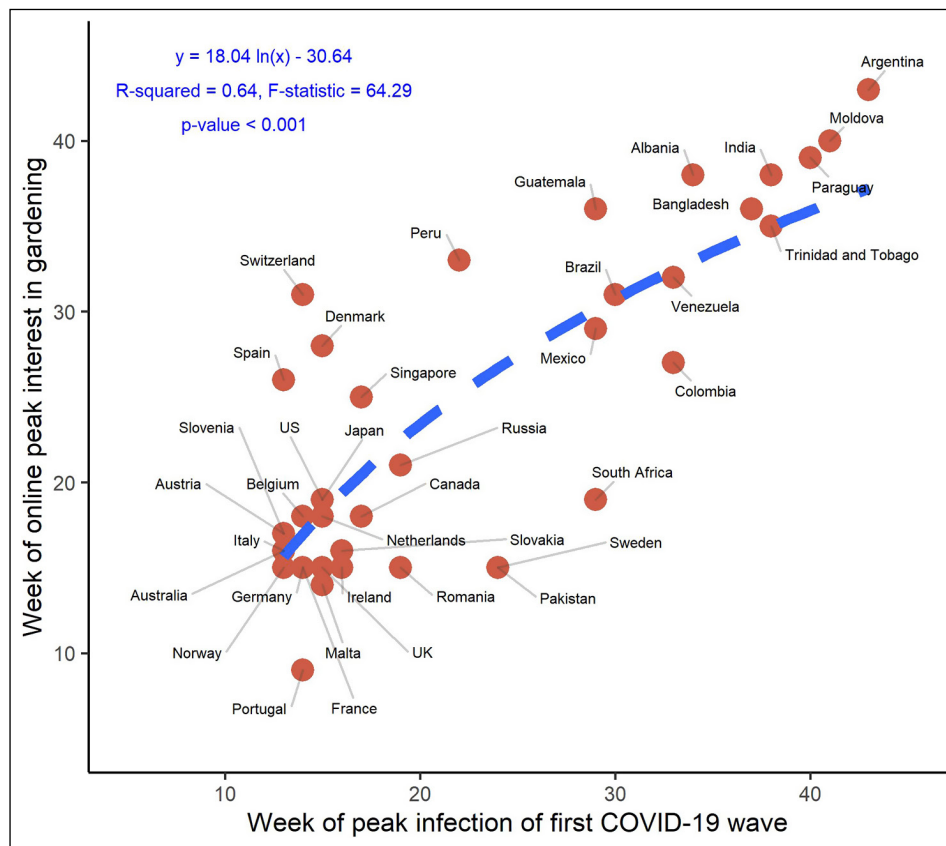
These data provide a window into people's interests during the early days of the pandemic. Yet, the reasons for the spikes in interest and motivation have so far received little scientific attention but are starting to be investigated in more detail (eg Poortinga *et al.* 2021; Theodorou *et al.* 2021; Ugolini *et al.* 2021). Given the generic search term, “gardening”, it may be that the online searches were returning experienced gardeners who took advantage of time at home to renew a previous interest. However, there may have been new gardeners who were interested in gaining knowledge about garden establishment and management, or locating equipment, plants, and soil. The motivations behind these investigations toward gardening deserve to be

researched further to understand the various mechanisms associated with behavioral changes, especially in times of crisis like this pandemic (Geary *et al.* 2021), as well as to answer questions such as whether people gained a new or renewed interest in gardening during lockdowns, or desired more or less access to nature during this time of hardship (Marsh *et al.* 2021).

There is a clear pattern in increased gardening interest during the COVID-19 pandemic. Will this surge in interest ultimately outlast this pandemic? Emerging research shows that during the pandemic, urban greenspaces provided multiple, meaningful benefits for solace, respite, and social interaction, as well as physical exercise (Home and Vieli 2020; Ugolini *et al.* 2020), and that people consider greenspaces to be more important for physical and mental health than ever before (Niala 2020). Research is still needed to understand the complexities and nuances of the patterns found. These worldwide patterns present ideal opportunities – through natural experiments – to study the long-term interest in and benefits of gardening.

Different patterns in the spread of COVID-19, along with different countermeasures (eg duration and intensity of restrictions, access to shops and schools), offer a chance to examine how various lockdown experiences may affect the behaviors and long-term values of specific individuals and communities with respect to gardening and greenspace use. When compared across geographical and social contexts, these differences represent an additional topic for further study.

Research on land development policies and collective decision-making processes is needed to understand how to maintain space for gardening in increasingly dense cities (Lopez *et al.* 2020; Niala 2020). What structural changes can be quickly enacted to ensure that this interest in gardening is capitalized on and translated into meaningful decision and policy making, as we enter a future with potentially more pandemics and other public health crises? What policies must we implement to support equitable



**Figure 1.** Global relationship between the date of COVID-19 peak infection during each country's first wave and the online peak popularity for the term "gardening". Daily counts of new COVID-19 cases reported per unit of population (ECDC 2020) were used to calculate the week when new COVID-19 infections peaked for each country during the respective first wave of infection. The term "gardening" was translated into 17 languages that represent an official language for each country (Google 2020). Online peak popularity for the translated search term refers to the relative popularity of this term versus other terms over time (2–5 years based on available data). The regression model was fitted in R 3.6.1 (R Core Team 2016).

access to gardening for human health and well-being, and to what extent can gardening be applied as a widespread public health strategy? A better understanding of the motivations for, enablers of, and barriers to gardening can inform policy mechanisms that provide not only equal and fair access and availability for those who are interested in gardening but also opportunities for others to learn about gardening and spend time in greenspaces.

Despite its many challenges, the COVID-19 pandemic offers an important chance to investigate the capacity for additional human–nature interactions through the development and management of gardens, and to help reverse the decline in meaningful nature experience for contemporary societies. Our findings here demonstrate that gardening can increase opportunities to interact with nature close to home, and might

systematically and simultaneously enhance global public health, well-being, and ecological outcomes long after the COVID-19 pandemic ends.

### Data Availability Statement

Data and code are available at <https://doi.org/10.6084/m9.figshare.14920365>.

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## FrontiersEcoPics

### Crow predation on intertidal invertebrates

**W**idely distributed across North America, the American crow (*Corvus brachyrhynchos*) feeds on a variety of foods, from insects to human-generated food waste. However, American crows along the western coast of Washington State and British Columbia appear to have adapted their habitat use and foraging behavior to exploit the intertidal zone in response to abundant food along the seashore.

These photographs show a locally adapted American crow in the process of consuming a stout coastal shrimp (*Heptacarpus brevirostris*) following a successful hunt during low tide in the intertidal zone of Tower Beach, Vancouver. This individual used its beak to dislodge mussels, rocks, and seaweed in search of prey and ultimately to capture the stout coastal shrimp in a shallow tide pool.

The intertidal zone provides habitat for many invertebrate taxa that are important prey items for coastal populations of American crows. However, climate change may alter the abundance and distribution of these prey species. Could a change in intertidal community composition result in further adaptation to the diet and foraging behavior of the American crow?



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 doi:10.1002/fee.2424