

Backgrounder – Research on therapeutic effects of greenery

The benefits of interacting with nature have been widely documented and accepted internationally. People can derive health benefits when they connect with the natural environment through visual exposure, engaging in activities in a nature setting, or by interacting with plants and other natural elements.

The National Parks Board (NParks) has been working with the National University Health System (NUHS) and other institutions to build evidence-based insights on the effects of nature on health in Singapore, so as to enhance the design of green spaces and therapeutic horticulture programmes. Examples of research studies that have been published fall under a research framework that aims to understand how people's physical and mental health are affected by (1) landscape design; (2) use of parks and greenery; and (3) participation in horticultural programmes.

(1) Landscape design

- Passive exposure to a therapeutic garden induces desirable changes in mood and brain activity in depressed adults

This study, which compared the effects of in-situ passive exposure to three types of urban spaces on brain activity and self-reported momentary mood in healthy and depressed adults, was conducted between 2018 to 2021. The urban spaces investigated were: the Therapeutic Garden at HortPark; a green space in a residential garden (HDB roof garden in Clementi); and busy downtown (Chinatown).

The findings showed that exposure to the therapeutic garden resulted in better mental wellbeing outcomes in both groups of participants, compared to the other test sites. It demonstrated that both depressed and non-depressed individuals can benefit from therapeutic garden exposure. The two green spaces in the study were evaluated using the Contemplative Landscape Model which assessed landscapes based on seven features, with the Therapeutic Garden having a higher score. The findings further confirmed that the Contemplative Landscape Model, an expert-based tool for assessing landscapes on their contemplative quality, also assesses its potential for promoting mental well-being. NParks has



since developed the Design Guidelines for Contemplative Landscapes to aid landscape professionals in applying this tool.

The study provided evidence that passive exposure to therapeutic nature can constitute an effective and affordable supplement to depression treatment for patients, which paves the way for developing therapeutic garden-based interventions. It can also function as a self-care practice for a healthy population to maintain their mental health.

The provision of easily accessible therapeutic gardens to city residents can then be an important strategy for mental health promotion at the city scale and has the potential to offset the negative influence of the busy urban environments on mental health.

This project was conducted in collaboration with Department of Psychological Medicine at the Yong Loo Lin School of Medicine, National University of Singapore (NUS Medicine). These findings can be found in the paper titled “Therapeutic garden with contemplative features induces desirable changes in mood and brain activity in depressed adults” and will be published in the journal, *Frontiers in Psychiatry*. The study was supported by the MND Research and Innovation Fund.

(2) Use of parks and greenery

- The influence of the COVID-19 pandemic on the demand for different shades of green

While urban green spaces have been shown to be valuable in most socio-cultural context, previous studies did not explore whether different types of urban green spaces meet different needs of urban dwellers in a unique situation like the COVID-19 pandemic. As a result, it is expected that the type of urban green spaces would confer a different extent of effect to its users and reciprocate varying responses.

A project done by NParks examined how people sought out urban green spaces with different degrees of naturalistic landscapes to satisfy personal needs over various phases of COVID-19 mobility restrictions imposed in Singapore.



The study utilised four data sets to compare demand for and visitorship patterns of urban green spaces before the pandemic (Pre-Circuit Breaker), the duration of the strictest mobility restrictions (Circuit Breaker), and after the measures were relaxed (Post-Circuit Breaker). The data sets included (i) Google Search trends as a proxy for demand for urban green spaces, (ii) Google mobility data for an overview of population visitorship trends, (iii) visitor counts for granular insights on actual visitorship trends, and (iv) qualitative data on perception of parks by park visitors after restrictions eased.

The pandemic had heightened the demand for cultural ecosystem services provided by urban green spaces like parks and nature areas in Singapore, with an increase in visitorship and preference for less manicured urban green spaces such as Bukit Timah Nature Reserve. The study found that though the restrictions had affected the use and interest in urban parks, the demand for urban parks exceeded pre-COVID-19 levels once the restrictions were reduced. The high demand suggested the importance of these urban green spaces during the pandemic.

This project was conducted in 2020 and the findings were detailed in a paper titled “The influence of the COVID-19 pandemic on the demand for different shades of green”, published in the journal *People and Nature*.

- Daily park use, physical activity, and psychological stress: A study using smartphone-based ecological momentary assessment amongst a multi-ethnic Asian cohort

A study, conducted between 2018 to 2019, investigated the association between daily park use and stress. It also examined the relationship of daily park use and leisure-time physical activity with stress; their combined effects, and whether associations of daily park use and leisure-time physical activity with stress are independent. The study was conducted in collaboration with the Saw Swee Hock School of Public Health.

The study results showed that participants who visited parks during a day were less stressed on the same evening than those who did not visit parks. Similarly, participants who were physically active during a day were less stressed on the same evening than those who were not physically active. Daily park use and leisure-time physical activity on the same day was also associated with less stress, and this measure of association was lower than those



comparing daily engagement in only one of the two activities. The effects of park use and physical activity on lower perceived stress were therefore independent, and each activity on its own is beneficial to reducing stress amongst adults in urban settings.

The study's findings were documented in the paper "Daily park use, physical activity, and psychological stress: A study using smartphone-based ecological momentary assessment amongst a multi-ethnic Asian cohort", and published in the journal, *Mental Health and Physical Activity*. The study was supported by the MND Research and Innovation Fund.

(3) Horticultural programmes

- [The impact of gardening on mental resilience in times of stress: A case study during the COVID-19 pandemic in Singapore](#)

A joint project with the Mind Science Centre of the NUHS investigating the benefits of gardening on the mental resilience of Singapore residents was conducted in 2021 in conjunction with the Gardening with Edibles initiative.

As part of the study, a survey was administered on participants of the Gardening with Edibles programme to find out their mental resilience scores and engagement in gardening activities. Through comparative analysis on the scores between participants who engaged in weekly gardening and participants from another general online community, it was found that the mental resilience of those who gardened was statistically significantly higher. Further analysis on the gardening group showed that more than one hour of weekly gardening time associated with better scores. The Mind Science Centre provided the data for the general community.

The COVID-19 pandemic presented a multitude of stresses leading to the deterioration of mental health. The results have an important implication – interventions like gardening, which can enhance mental resilience, may be useful in mitigating the adverse effects of stress brought about by the pandemic.

The study's findings have been collated in the paper "The impact of gardening on mental resilience in times of stress: A case study during the COVID-19 pandemic in Singapore" and was published in the journal *Urban Forestry and Urban Greening*.