Chapter 4
How Breaks in Nature Can Affect the Users' Wellbeing: An Experience-Based Survey During the Lockdown (COVID-19): Strategies for Healthy and Resilient Green Areas in Our Cities

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Abstract In the occasion of COVID-19 pandemic, the life of citizens was greatly disrupted—from healthcare professionals to the smart workers—and consequently also the state of mood. On the basis of the scientific evidence about the relationship between the built environment and health, a research group has promoted an investigation on the benefits that greenery can have on the psycho-physical state of the users, especially healthcare staff and users at home. The methodology adopted is the Profile of Mood States, which provides experiential activity in nature—without any technological distraction- to evaluate the benefits of mood. The methodology adopted refers to the shorter version (34 items) elaborated by prof. Grove at the University of Western Australia. About the COVID-19 pandemic, the experience-based questionnaire was administered to general users in Italy. The questionnaire is composed of a few questions, to be completed before and after an experience in nature of 20/30 min. The investigation requires to be carried out in private gardens, balconies and/or terraces with greenery, public green areas, etc. 225 participants took part to the investigation. Data analysis highlighted the higher performances in anxiety, depression, anger, force, fatigue, and confusion, for users who had the experience in the garden

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(-50/70%). Although it is well-known the benefits that nature affects positively on well-being and stress level of users, the investigation underlines that a brief break in nature—especially in a period of great stress such as the pandemic—can influence the well-being and mental health of users. The chapter aims to list and suggest some design strategies for a new approach to the design of healthy cities.

Keywords COVID-19 · Experience-based survey · Experience in nature · Profile of Mood States · Healthy cities

1 Introduction

The recent SARS-CoV-2 pandemic has affected significant upheavals in daily life and, as a consequence, in the users' mood (stress, distraction, anxiety, etc.), especially during the lockdown (Capolongo et al., 2020; Spencer et al., 2020).

As already argued by the Scientific Community, greenery and nature have a very important influence on psycho-physical well-being and a quite influential therapeutic effect on mental health (Botta, 2017; D'Alessandro et al., 2015; Gianfredi et al., 2021).

Among the activities promoted by the Design & Health LAB of Dept. Architecture, Built environment and Construction engineering (DABC) at Politecnico di Milano (Italy), a study was promoted in recent months with a multidisciplinary working group, composed of experts in the field of hospital design and healing gardens, to measure the psycho-physical wellness of people, in a rather stressful moment (Gola et al., 2021), such as the COVID-19 pandemic (Morganti et al., 2022; Cuerdo-Vilches et al., 2020; Signorelli et al., 2020).

For the development of the survey, the administration of an online questionnaire was planned with the scope to assess the benefits that 20/30 min in nature—without technological distractions—can affect the user's psycho-physical conditions. To conduct the investigation, the working group used the Profile of Mood States (POMs) methodology, also known as "mood profile" (White et al., 2019).

The questionnaire was structured for two different populations: one for the healthcare staff (Gola et al., 2021), and the other for the general population. This contribution shows the data analysis related to the general population.

2 State of the Art

In recent decades the relationship between man and nature has been investigated by many scientists (Berto & Barbiero, 2017; Berto et al., 2015). Several studies have led to explain the processes of influence on users' attitudes for defining the importance of nature in the social context (Kaplan & Kaplan, 1995). In particular, our Society—only in recent years—highlighted the need to return to the natural environment.

Among the studies in Japan, several experiments were activated to assess the level of the stress hormone, through the cortisol contained in the saliva of users, with the shinrin-yoku (Li, 2018). This is the practice of walking unhurriedly in a forest, for a short or a long time (Miyazaki, 2018). For several years, few results were obtained, but since the 2000s scientific progress has made it possible to measure the activities of the brain and the autonomic system, allowing defining various parameters and indicators of the level of stress in the human body (Fehr & Capolongo, 2016; Ulrich, 1999). Several scholars, especially in Japan, have begun to study the psychological and physiological effects of the natural environment on human health and well-being (Rousseau & Deschacht, 2020).

The in-depth scientific investigations over the decades have led to the effectiveness of the natural environment on the psycho-physical well-being of users (Kaplan, 1995).

The need for contact with green areas, gardens, terraces, etc. became strong during the lockdown due to the COVID-19 pandemic (Corley et al., 2021; Uchiyama & Kohsaka, 2020; Molaei et al., 2022; Peters & Masoudinejad, 2022). The influence that these areas, whether small or large, affect in terms of wellness, can also be seen in the immersion in nature, also in a few minutes (Capolongo et al., 2020). For improving the knowledge in the field, and starting from the recent extreme emergency, the authors assess the benefits that green can affect the general population, highlighting its importance in living spaces (D'Alessandro et al., 2017).

3   Methodology

To conduct an experience-based study, the working group used the POMs methodology referring to the studies of prof. J.R. Grove (Grove & Prapavessis, 1992).

This methodology requires the user to fill in, before and after the experience in nature, a questionnaire to evaluate the benefits for the user through the scores. It is required to the participant during the survey (Gola et al., 2021):

to fill in the initial questions relating to the user's general information;

to fill in the questions related to the 34 items of POMs, before the experience in nature;

to have the experience in nature (20/30 min, without any technologies);

to fill the questions related to the 34 items of POMs, after the experience in nature.

To process all the information, it was necessary to fill in the questionnaire in its entirety.

In addition to general information about the users (initials of name and surname, date of birth, and gender), the sections to be filled in requested:

employment (employee, self-employed, retired, unemployed, student, etc.);

type of workspace (headquarters/company/office, site construction, smart working, etc.);

presence of a garden and/or green area in the current working area (yes, no);

green space in which the experience-based was conducted (shared garden, private yard, garden or public park, balcony or green terrace).

The research work refers to Robert J. Grove previous studies with the same list of 34 criteria (Grove & Prapavessis, 1992). Unlike the study of prof. Grove, the issue "furious" has been moved from the macro-area "Force" to "Anger", due to incorrect translation by the working group (in the Italian language the term "furious" has a negative meaning instead of "frenetic" and/or "impetuous", as the original questionnaire suggested) (Gola et al., 2021) (Table 1).

The order of the 34 emotions is defined by the method adopted (Grove & Prapavessis, 1992). Many of them are very similar and the choice to use synonymous terms is inherent in the methodology. These different adjectives refer to six macro-areas of mood:

anxiety: tense, on edge, uneasy, restless, nervous, anxious (24 points);

depression: unhappy, sad, lacking hope, discouraged, miserable, helpless, worthless (28 points);

anger: angry, grumpy, annoyed, resentful, bitter, furious (24 points);

force: lively, active, energic, energized, vigorous (20 points);

fatigue: worn-out, fatigued, exhausted, weary, drained (20 points).

confusion: confused, unable to concentrate, bewildered, forgetful, uncertain about things (20 points).

Each macro-area is associated with different scores. 4 points are associated with each mood state (Grove & Prapavessis, 1992).

During the survey, each participant filled in all the items twice: before and after the survey in the green area. The investigation was disseminated through social networks and web pages of institutions involved in the research. The working group aimed to administer the questionnaire to a representative number of users, equal to 600, but in total 225 participants joined the survey.

4 Discussion and Implications

Comparison by type of work activity carried out during the lockdown

The fundamental data that emerges from the analysis is that 59% (132 participants) worked in smart working, 13% (40 ones) in their working station and/or on-site, and 28% answered "other" (users on maternity leave, unemployed, retired, housewives, etc.). In general, it can be said that for many people smart work represented an important improvement in well-being as they feel practically free to work as they see fit. For these people, the performances and their moods will be at the top.

However, for other people, this mode has generated a sense of abandonment. Alone in their homes perhaps without being able to have contact with nature and with other people, they could gradually go into "burn-out" (Fig. 1).

Table 1 List of 34 items of POMs, with their respective scores that the user can choose. Table reworked by Grove and Prapavessis (1992)

| State of the mood		Not at all	A little	Moderately	Quite a lot	Extremely
		0	1	2	3	4
Tense	ANX	0	1	2	3	4
Angry	ANG	0	1	2	3	4
Worn-out	FAT	0	1	2	3	4
Unhappy	DEP	0	1	2	3	4
Lively	FOR	0	1	2	3	4
Confused	CON	0	1	2	3	4
Sad	DEP	0	1	2	3	4
Active	FOR	0	1	2	3	4
On edge	ANX	0	1	2	3	4
Grumpy	ANG	0	1	2	3	4
Energic	FOR	0	1	2	3	4
Lacking of hope	DEP	0	1	2	3	4
Uneasy	ANX	0	1	2	3	4
Restless	ANX	0	1	2	3	4
Unable to concentrate	CON	0	1	2	3	4
Fatigued	FAT	0	1	2	3	4
Annoyed	ANG	0	1	2	3	4
Discouraged	DEP	0	1	2	3	4
Resentful	ANG	0	1	2	3	4
Nervous	ANX	0	1	2	3	4
Miserable	DEP	0	1	2	3	4
Bitter	ANG	0	1	2	3	4
Exhausted	FAT	0	1	2	3	4
Anxious	ANX	0	1	2	3	4
Helpless	DEP	0	1	2	3	4
Weary	FAT	0	1	2	3	4
Energized	FOR	0	1	2	3	4
Bewildered	CON	0	1	2	3	4
Furious	ANG	0	1	2	3	4
Worthless	DEP	0	1	2	3	4
Forgetful	CON	0	1	2	3	4
Vigorous	FOR	0	1	2	3	4
Uncertain about things about things	CON	0	1	2	3	4
Drained	FAT	0	1	2	3	4
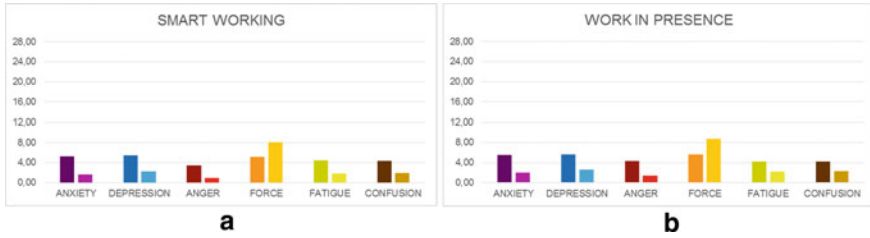
Fig. 1 **a** and **b** Results of the Macro-areas divided between users in smart working and at work in presence. Graphs elaborated by the authors

From the data analysis, the survey shows that the general trends of the 6 macro-categories are similar. An important observation is dutiful on the state of mind of the "Force" generated by green spaces, where the team notices a surge in the relative value of the people who worked on site. It is as if, not having the full availability of time, the moment they can access it, they benefit more than the smart workers who always have green space available.

Comparison by type of occupation of the participants

From the data analysis, it emerges that 64% (143 participants) of the population were employees and self-employed workers, defined as "workers", while the remaining 36% (82 participants) are divided between retired, housewives, students, the unemployed, and those who answered "other", defined as "unemployed".

It was decided to divide these two groups thinking about the flexibility of the use of their own time. The group identified as "workers" has limited time availability and is tied to working hours, unlike the "unemployed" group. From an initial examination, it is clever that the general trends of the 6 macro-categories are similar (Fig. 2).

The choice to subdivide the population into these two macro-areas permits highlight how the unemployed have had greater benefits in the experience of contact with nature although the values are almost aligned.

The "Force" assumes a very important role: it is as if nature has allowed people to recover that strength and lucidity that everyday life had somewhat forgotten. Finding the scope, albeit limited and momentary to the survey, has raised this value to 69%.
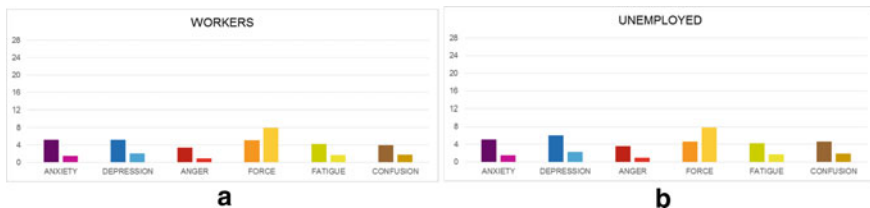

Fig. 2 **a** and **b** Outcomes of the Macro-areas divided into workers and unemployed. Graphs elaborated by the authors.

Comparison by gender and age groups

The data that emerges from the analysis is that 24% (55 participants) of the population is under 30 years, 52% (117) is between 30 and 60 years old and 18% (41) is over 60 years of age. It is also recorded that 5% (12) did not indicate their age. This population, not being representative, was excluded from this comparison; in the same way, users who answered "I prefer not to answer" regarding gender was excluded.

Therefore, as the Figures show, the analysis conducted takes into consideration the responses of the participants divided into men and women, subdivided by age groups. The letters "F" and "M" correspond respectively to "female" and "male".

From an initial examination, it is observed that the general trends of the 6 macro-categories are similar more evidence are related to the female population over 60 years of age (Fig. 3).

The environment influences people's state of well-being and how immersion in nature for at least 20 min is affecting positively for everyone, especially women over 60 (Corley et al., 2021). This new habit must be acquired and administered consciously to all people, regardless of age group, for the protection and prevention of well-being and mood.

There are "thinking styles" that naturally predispose us to stress so it is necessary both to know them and to implement behaviors that allow people to overcome this
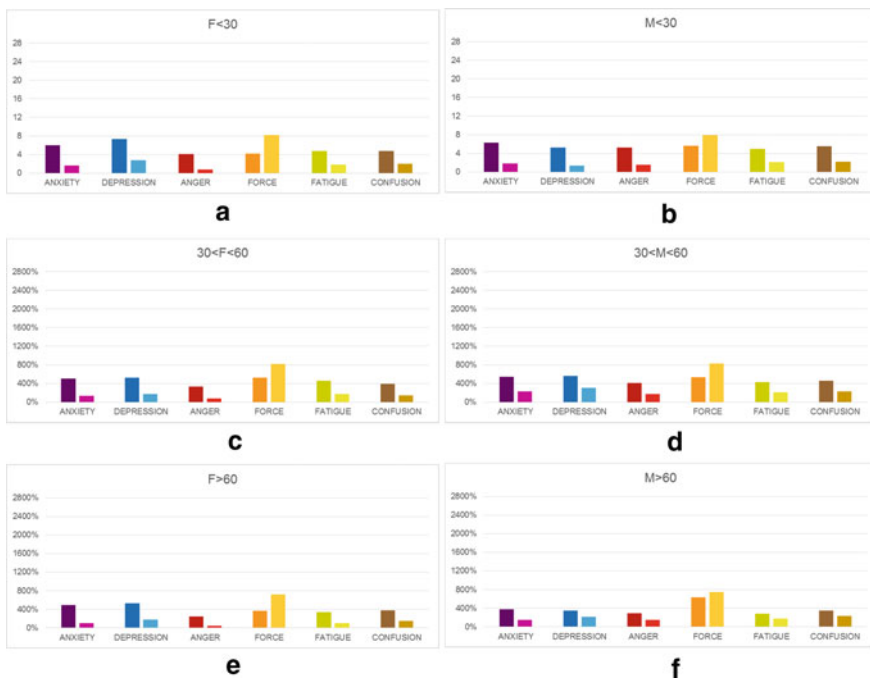

Fig. 3 a–f Results of the Macro-areas subdivided between men/women and age group. Graphs elaborated by the authors

Fig. 4 a and **b** Results of the Macro-areas divided into types of public and private green areas. Graphs elaborated by the authors

condition. For example, people who like to immerse themselves in their home garden every day had not suffered from the lockdown as people who like to access and benefit from nature each time in a different place (more variable). For these people, even having only a private garden or their own spaces available, was very restrictive.

Comparison by type of green used for the survey

From the data analysis, it emerges that 80% (179 participants) of the population surveyed a private green area, and the remaining 20% in a public area (public park, a shared garden, company garden, etc.).

This fragmentation of the type of green has allowed us to better analyze the data in our possession. The private green area includes the garden and the terrace, an intimate area for the exclusive use of the person who participated in the survey. On the contrary, the public green area is not for the exclusive use of people, who have to share the space with other "strangers" (Fig. 4).

An initial examination shows that the general trends of the 6 macro-categories are similar.

The data collected demonstrates how essential the possibility of using a private green space: either as a balcony or garden. It is evident that people who can use this space are favored in a better basic emotional state; provided that this space is habitually used consciously. This space, for the people who live in it, is an integral part, guaranteeing a solid starting point (Peters & Masoudinejad, 2022; Ugolini et al., 2020).

It is therefore clear that people with can only use public parks, have lower starting values but find their greatest exception, once again, in "force".

5 Concluding Remarks and Design Strategies for a New Approach for Healthy Cities

General considerations

The survey was structured on the six macro emotional categories (anxiety, depression, anger, fatigue, confusion, and force), and between before and after the immersion in the green area, in general, all the users had benefits with an indicative improvement

average of 50–60%, particularly in young people under 30 and in women over 60, while males over 60 are those who recorded the lowest values. In terms of force, the female population over 60 and under 30 observes peaks of 100%, and items such as 'lively' and 'vigorous' record values of 150 and 250% improvement compared to the initial response, instead in terms of anxiety and tiredness, the greatest benefits are recorded for the population in smart working compared to the workers on site, which highlights that in a phase of stress, such as that of the lockdown, those who have been forced to interrupt their daily habits, they benefited particularly during the experience in nature. In terms of 'Force', the highest values were recorded in the unemployed. As far as the type of greenery is concerned, in general, those who have used a private green area have had the greatest benefits, in terms of reduction of anxiety, depression, tiredness, and confusion, but even those who have lived in public green areas have had significant benefits in terms of force with peaks equal to 100% in 'lively' and 'stimulated'.

Users have found their maximum benefit in a green area, reaching greater calm and force. In this lapse of time, we could mention some thinking styles (referring to Sternberg) involved such as "relationship and tasks": this time was necessary for those who prefer relationships, to regenerate in nature with the presence of some colleagues; others may have been used to regain force and continue to do what they were doing. Styles influence each other.

Starting from a general analysis, it is clever how force acquires important values. The information collected outdoors is processed only through senses (sight, hearing, touch, taste, and smell) so the users analyze this data using these styles (Sachs, 2020). Specifically, getting in touch with nature activates all these senses. The person who prefers the sight will therefore notice all the different colors of the plants and flowers. The users who prefer hearing will notice all the sounds, noises, or the absence of noise (ward trolleys, steps, patient bells, etc.). Kinesthetic people (who prefer touch, taste, and smell sensations) will perceive more emotions when they are immersed in nature (touching the ground, or smelling the scent of plants).

Critical aspects of the investigation

The study highlights the great influence that nature can have on the well-being of users, even in a short time (White et al., 2019). Although the number of questionnaires was limited to more than 200 participants, the data processed are rather representative and supportive to develop useful considerations. In any case, the working group undertakes, for possible future similar episodes, to conduct the investigation again to expand the number of questions and get more detailed information to better support the data analysis.

In particular, starting from a general examination and various comments by the participants to the questionnaire, it is considered appropriate to supplement the questionnaire with the following information: a) geographical location of the user and urban context in which the survey was carried out; b) duration of the break dedicated to the experience in nature; c) specifications on the user's day and possible factors that may justify the presence of anomalous data; d) specifications relating to the space in which the survey was conducted and possible distracting and/or disturbing

factors; e) state of the green area in which the survey was conducted; f) activities carried out during the investigation (Kaplan, 1973); g) sensory activity.

New strategic lines: design strategies for a new approach to the design of healthy cities

Numerous studies have demonstrated how visibility in natural environments can affect physical and mental health. Although, as highlighted by some researchers, the view into a green area (a garden or park, greenery, green roofs, etc.) can improve the well-being of users (Buffoli et al., 2018; Gola et al., 2020; Grappasonni, 2018), the study has shown how—even in a brief break—a moment in the green can regenerate users, especially in times of stress.

The presence of green elements, in addition to having an important role in mitigating the impacts of the built environment on climate change and improving the ecological-climatic conditions of cities, brings a wide range of health benefits for all age groups (Appolloni et al., 2019; Engemann et al., 2019; Rebecchi et al., 2019). One of its main effects is the alleviation of the urban climate, helping to reduce the health impacts of heat waves, increase the moisture content in the air, and lower the temperature in hotter periods (Buffoli et al., 2022; Capolongo et al., 2018). In the absence of greenery, depending on the morphological characteristics of the city, the average maximum summer temperatures can be 1–3 times higher than in rural environments, with possible greater variations, especially at night (Solfani et al., 2018).

The study conducted demonstrated how—even for a short time—a break in nature can regenerate users, especially in times of stress.

From the data analysis, it is observed that for many users the values ranged between the values 0 (not at all)/1 (a little)/2 (enough), and therefore, on average, the values did not register particular differences, although the percentages are emblematic because they have reductions equal to 60/70/80% between the before and after the survey. The reduced values, even from a direct sharing of ideas with some participants in the survey, are often associated with the presence of many emotions that are very similar to each other and in some cases somewhat extreme, such as "furious", "dejected" and "exhausted". In any case, the difference in the answers before and after the investigation highlights the effects that a brief break in the green can affect on well-being. As the EBD studies demonstrated, the presence of spaces for psychophysical well-being is strategic for all users (Sachs, 2020).

Although the number of questionnaires was limited to more than 200 participants, the data processed are rather representative and supportive in developing useful considerations.

It is observed that within the general population, which has been forced to "stay at home", they have transformed their living environments into a place for leisure, work, study, physical activity, etc. testing the flexibility, versatility, and resilience of the spaces, and those in possession benefited from their own outdoor spaces (D'Alessandro et al., 2020).

Based on experience, the new trends in residential buildings will require the presence—at least—of a balcony for each apartment in the building regulations. Green

elements offer more opportunities to practice physical and recreational activities, thus helping to promote well-being and social inclusion, as well as reducing the frequency of various pathologies such as coronary heart disease, skeletal disorders, anxiety, depression, diabetes, etc. (Maas et al., 2009).

Equally interesting is the role of gardening, both in terms of education and well-being. This activity increases in psychological terms the individual force, strength, psychological well-being, relationships with others, sense of community, and cognitive function, especially in certain age groups (Soga et al., 2017). It also helps to reduce stress, anger, fatigue, depression, and anxiety (Wood et al., 2016). In addition, where it is not possible to have a private garden, a shared garden, or a terrace/balcony, the presence of a green facade or a view of park areas, trees, or green roofs could be partially optimal (Buffoli & Carli, 2012).

Similar considerations need to be taken into consideration also for the design of urban green areas. It is well-known that there are several advantages for the Community both for Public Health issues (physical, social, and psychological), the environment, and its resilience to climate change (Buffoli et al., 2022; Rebecchi et al., 2016; Shoari et al., 2020; Romano-Spica et al., 2015).

However, the current metropolises still lack an overall vision of green management capable of guaranteeing safe, qualitative, accessible, and equally distributed green areas throughout the territory (Capolongo et al., 2015; Oppio et al., 2020). Currently, several Countries have various municipal tools for mapping and managing Urban Green Spaces such as the Green Census, Regulations, Plans, etc. but they are often made of incomparable methodological information, and typically with quantitative information (Buffoli et al., 2020). Therefore, the greenery quantity presence in an area is not the representative factor for offering adequate green infrastructures for the Community.

Green Spaces represent a fundamental component of the public spaces and common services provided by a city. For greater social equity, and inclusion, it is necessary to ensure adequate territory distribution and quality, both in terms of design and services, and to verify accessibility for all (Davis et al., 2009; Dominelli, 2021).

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