Article

Perceptions of Urban Green Areas during the Social Distancing Period for COVID-19 Containment in Italy

Federica Larcher ⓘ, Enrico Pomatto *ⓘ, Luca Battisti ⓘ, Paola Gullino ⓘ and Marco Devecchi ⓘ

Department of Agricultural, Forest and Food Sciences, University of Turin, Largo Paolo Braccini 2, 10095 Grugliasco (TO), Italy; federica.larcher@unito.it (F.L.); luca.battisti@unito.it (L.B.); paola.gullino@unito.it (P.G.); marco.devecchi@unito.it (M.D.)
* Correspondence: enrico.pomatto@unito.it

Abstract: The scientific community recognizes that urban green areas play an important role in supporting human wellbeing. Green spaces are used differently by citizens accordingly to their age, gender, education, or lifestyle. During the coronavirus disease (COVID-19) pandemic period in 2020, public green areas were closed due to the limitations imposed by social distancing in Italy and people were forced to stay at home. The aim of this research was to investigate the importance of public green areas in the life of the population in relation to the limits imposed during the first lockdown in Italy. A participatory approach was used, and an online questionnaire focused on people's perceptions about the public attendance in green areas and their main uses pre-, during, and post-COVID-19 emergency period was administrated randomly to the adult population. The questions focused on the habit, frequency, and duration of park visits and about the individual perceptions and feelings about the green areas close (maximum 200 m distance) to their residences. A total of 3286 responses were obtained and analyzed at national and regional levels (Piemonte). In order to have a general national overview, a basic descriptive statistic was applied using all answers, elaborated in the form of percentages. At the regional level, questions were selected and compared to determine if answers were in related. Statistical analyses with chi-square tests and correspondence analyses were performed. The results indicated that the social distancing period for COVID-19 containment in Italy influenced perceptions about urban green areas. The importance of having outdoor green spaces was highlighted and an increase in interest about urban green areas was observed. Future planning strategies will have to consider the need of designing urban green areas for having more livable cities.

Keywords: human wellbeing; urban horticulture; questionnaire; ecosystem services; environmental justice; planning

1. Introduction

The United Nations Agenda 2030 defined 17 Sustainable Development Goals (SDGs) to be achieved within the current decade [1]. Particularly, Goal 11, "Sustainable Cities and Communities", closely connected with universal access to public green spaces. Appropriate urban planning that considers the design of public green areas can contribute to achieving this goal. Indeed, in an urban context with a growing global urban population, public parks and gardens can provide spaces for recreation, contact with nature, and satisfy different social and cultural needs [2,3]. The importance of urban green spaces for improving resilience and adaptation to new challenges (i.e., climate change, urban growth, and social inclusion) has been recognized by several authors [4–6]. Moreover, these spaces provide many ecological, psychological, and social benefits [7,8]. For example, in 2020, Battisti et al. [9] showed that in an urbanized context (City of Turin) the ecosystem services provided by public green areas differed among neighborhoods and were related with socio-demographic conditions.

Green spaces are used differently by citizens based on age, gender, education, or lifestyle. They are considered as outdoor places, designed, planned, and managed with a

significant amount of vegetation (trees, shrubs, and herbaceous species) and compositional elements. Indeed, green areas concur to create a close link between residents and the environment [10]. According to Tzoulas et al. [11], green spaces are important for human wellbeing, in particular a psychological one [12,13]. Several studies have confirmed how the attitude towards the environment is multidimensional, influenced by demographic features, knowledge, and environmental context [14]

All of the scientific studies mentioned above have been carried out by analyzing in situ the citizens and visitors in a period of public use of urban green spaces. However, the perception and values of green spaces by local residents in a period of limited-use or non-use of these spaces, have been unknown. However the unprecedented situation in the 2020 health emergency linked to the coronavirus disease (COVID-19) global pandemic imposed a series of social and spatial limitations on international and national levels.

In this context, several studies have analyzed the perceptions and needs for green spaces among the population during the first wave of the pandemic in Europe. As an example, in the UK, at the start of the lockdown, people were advised to maintain a relationship with nature by spending more time in parks, at a safe distance from other people, to relieve the stress of isolation [15,16]. Venter et al. [17] observed that during the pandemic emergency in Oslo (Norway) green spaces played an important role in reducing stress and supporting closed indoor activities (for example, physical activities). Regarding mental health, Amerio et al. [18] highlighted the importance of living in a house facing green areas during the social distancing period in Milan (Italy).

In Italy and in Spain, Ugolini et al. [19] showed that during the first lockdown green areas and their use were strongly missed by the population. The theme of perception was particularly important when linked to other relevant issues, such as the increase in intense weather phenomena and the onset of pandemics. In this perspective, we decided to investigate the perception of public green areas in the life of the population in relation to the limits imposed during the first lockdown in Italy.

From the 21st March to the 3rd May 2020, all Italian public parks were closed, and citizens had to stay within a distance of 200 m from their home. During this 44 days, people were allowed to leave home only for food provisioning and pharmaceutical supplies, working, walking the dog, or serious health problems. This emergency brought about changes in the lives, needs and habits of the population. Green areas had acquired importance for human wellbeing, social justice and equity [20].

The aim of the research was then to investigate the importance of public green areas in the life of the population in relation to the limits imposed during the first lockdown requiring spatial and social distancing for COVID-19 containment in Italy. The purpose is to elucidate the concepts of green areas and their human's perception and preference answering to the following four main questions: (i) What were the habits and favorite elements about public green areas before the social distancing period for containment of COVID-19 in Italy?; (ii) What was the perception of public green areas during the social distancing period?; (iii) Has the social distancing period, during which public green areas were closed, changed habits and preferences about them?; (iv) Which public green area elements need to be considered in future planning strategies?

2. Materials and Methods

2.1. Questionnaire Survey

The role of urban green spaces in the quality of life for citizens has been studied across multiple disciplines in participatory studies. Using this participatory approach with face-to-face interviews, several authors demonstrated that public green spaces are perceived in different ways by residents. The main differences are due to the presence or absence of these areas close to home and their main use [21,22]. These participatory techniques as well as questionnaires are considered scientific tools. Indeed, using a questionnaire, Balram and Dragi'cevi´c developed a survey instrument to measure attitudes towards urban green spaces [23]. In their study, using semi-structured interviews, they evaluated a

set of variables (gender, age, education, and income) that influenced directly and indirectly their relationships to attitude towards urban green spaces. In addition, Kothencz and Blaschke studied the relationship between spatial indicators (area of the parks, area of vegetative surfaces, presence of water, number of buildings and surrounding architecture) of urban green spaces and visitor perceptions of the green spaces in the metropolitan area of Szeged, Hungary [24]. These studies analyzed the need for and perception of green spaces in relation to their availability in urban environments. The use of online surveys have also become a priority, especially at times when social and spatial distancing have been imposed [19].

In our study, we used an online questionnaire as a participatory technique. The online questionnaire was administered randomly to analyze perceptions about public green areas and their main uses in the pre-, during, and post-COVID-19 emergency period. The questionnaire was administered from 6 April to 3 May, 2020, to an adult population residing in any of the 21 Italian regions. As a result of the limitations imposed by COVID-19, the questionnaire was administered via Google Forms, a platform used in several scientific studies [25,26]. The survey started about two weeks after the beginning of the social distancing period in Italy.

The questionnaire was subjected to a pre-test phase (14 completed questionnaires) to verify the layout, content, and wording of the questions. The questionnaire was written in Italian and was comprised of 24 questions, of which 5 were yes/no and 17 were multiple-choice questions.

The various questions were related to the habit, frequency, and duration of park visits and about an individual's perception and feelings about the green areas close (maximum 200 m distance) to their residences. The questionnaire was subdivided into four sections:

I.   Respondent's characteristics (questions 1–11);
II.   Use of public green areas and their favorite elements prior to the social distancing period (questions 12–15);
III.   Public green area perception during the social distancing period (questions 16–21);
IV.   Potential use of public green areas and change of habits after the social distancing period ends (questions 22–24).

Table 1 lists the questions and answer choices used in the questionnaire.

Survey respondents were informed about the objectives of the study and the time required to complete the questionnaire (approximately 5 min). In order to reduce social desirability bias, Nederhof [27] suggested guaranteeing anonymity for the respondents. For such reasons, the questionnaire was administered to maintain respondent anonymity.

2.2. Questionnaire Administration

The link to the survey was shared by its authors starting from their contacts and mailing lists using email and WhatsApp®. It was sent to several institutions and associations throughout Italy asking for it to be sent to their members. The link was also hosted on the internet site and Facebook® page of the Department of Agricultural, Forest, and Food Sciences at the University of Turin. The post on Facebook® was shared by the authors and several interested people. The idea was to generate a sort of chain for which the questionnaire could be sent by respondents to their contacts. For these reasons, authors cannot know the real number of people that received the link.

2.3. Ethics Statement

By reading the first paragraph and by filling out the form, the respondents expressed their consent to the use of information for research purposes. No identifiable personal data were requested or acquired. Moreover, the questionnaires submitted were self-completed questionnaires and did not require the presence of researchers. The questionnaires were freely available, and data were anonymously collected only for research purposes, as mentioned.

Table 1. Questions and Answer choices used in the questionnaire.

Questions	Answers Choices
I. Respondent's characteristics	
1. Age	(Number of years)
2. Gender	Male; Female; Other
3. Education	Master/PhD; University degree; High school; Primary school; Secondary school
4. What Region do you live in?	List of the Italian regions
5. In which region are you spending the social distancing period?	List of the Italian regions
6. Do you live in a densely urbanized area?	Yes; No
7. Is there a public green area within 200 m from your house?	Yes; No
8. How many people do you live with?	(Number of people)
9. Are there minors living with you?	Yes; No
10. Are there any pets in your home that need to go out daily?	Yes; No
11. Is gardening a hobby of yours?	Yes; No
II. Use of public green areas and their favorite elements before the social distancing period	
12. Before the period of social distancing, how often did you use public green areas in your city?	Once a week; three times a week; every day; I did not frequent them.
13. What was your primary reason for visiting public green areas?	Walking alone; walking with children; walking the dog; doing physical activity; meeting friends; other activities.
14. Is there a secondary reason why you were using them?	Go for a walk alone; get together with friends; go for a walk with children; walk the dog; do physical activity; no secondary reason.
15. Before the period of social distancing, which of the following elements did you prefer in public green areas?	Trees; lawns; flowers; animals.
III. Public green area perception during the social distancing period	
16. During this period of social distancing, which of the following outdoor spaces did you use?	Private garden; residential courtyard with greenery; residential courtyard; private terrace with greenery; private terrace; none of the above options.
17. What were your thoughts related to your physical/psychological need to enjoy a public green area?	Pressing; recurrent; occasional; absent.
18. How has your interest in public green areas near your home changed?	Increased; unchanged; decreased.
19. Would you be willing to move to have green spaces nearby?	Yes and I will; Yes but I cannot do it; no because I already have them; no because I do not care for them.
20. Which of the following activities did you miss most in public green areas?	Carry out my usual activities; see the blossoms; enjoying the shade of the trees; see the people I usually met there; hear and see the animals; none of the proposed aspects.
21. Do you think that a gardening activity can be useful for achieving/maintaining adequate psychophysical levels?	Yes; No; I do not know.
IV. Potential use of public green areas and change of habits after the social distancing period ends	
22. When the period of social distancing will end, do you think you will visit public green areas in your city more frequently?	Yes; No; I do not know.
23. When the period of social distancing will end, would you be willing to become a volunteer who maintains public green areas close to your home?	Yes, I used to do it before and I would do it now; Yes, I did not do it before but I would do it now; No, I used to do it before but I would not do it now; No, I did not do it before and I would not do it now.
24. When the period of social distancing will end, in which of the following places would you first like to go?	Public green area; shopping center; gym; cinema; other.

2.4. Data Analyses

Due to the non-homogeneity of the sample, the collected answers were analyzed according to the region where respondents spent the social distancing period (question 5). Thus, the national level included all answers, and the regional level included only the answers from people that spent the lockdown in Piemonte region.

At the national level, basic descriptive statistics were applied for a general overview. Respondents were divided by the Italian region where they spent their social distancing

period and were described/analyzed for their socio-demographic characteristics (gender and age). Principal questions, taken from the four section in which the questionnaire was subdivided, were selected. Questions 4, 7, 8, 9, 10, 14, and 16 were not selected because they were less significant for the general analyses. Answers were elaborated in form of percentages.

At the regional level, the Piemonte region was chosen as a case study because provided the highest number of responses. This is due to the method of survey administration explained above; all of the authors live and work in Piemonte and the highest numbers of their contacts were also from Piemonte. The region was also unfortunately among the most affected in Italy by COVID-19. It is located in the north–west of Italy with a surface of 25,387.07 km^2, and 4,341,375 inhabitants [28]. The Piemonte region is located in the Po Valley, and the most urbanized areas, especially the capital (Turin), has serious air quality problems that cause numerous respiratory problems among its citizens [29–31].

An in-depth analysis was carried out from the answers provided by respondents who spent their social distancing period in the Piemonte region. In an integrated way a couple of questions were selected and analyzed. In order to study the perception of urban green areas during the social distancing period and understand the variables that influenced it, answers taken from different sections of the questionnaire were compared. In Table 2, some selected questions are listed.

With the aim of verifying if there was a relationship between the two answers within those selected, a chi-square (χ^2) test [32] was used. For the combinations with relationships suggested by the chi-square test (p-value < 0.05), the same was verified with correspondence analysis (CA) for better exploring the relationship between variables [33]. The most significant CA factors were reported and explained. Statistical analyses were performed with RStudio software—R version 3.6.0, code name: "Planting of a Tree" (open access).

Table 2. Some of the questions selected for comparing the different sections of the questionnaire.

	Public Green Area Perception during the Social Distancing Period (Section 3)	Potential Use of Public Green Areas and Change of Habits after the Social Distancing Period (Section 4)
Respondent's characteristics (1st section)	1–17; 1–18; 1–21; 2–17; 2–18; 2–21; 3–18; 3–21; 6–17; 6–18; 7–17; 7–18; 7–19; 10–17; 10–18	1–22; 2–22
Use of public green areas and their most desirable elements before the social distancing period (2nd section)	12–17; 12–18; 15–20	12–22
Public green area perception during the social distancing period (3rd section)	16–17; 16–18	16–22

3. Results

3.1. Preliminary Analyses at National Level

In total, 3286 individuals answered the questionnaire. In Table 3, respondent age range and gender, divided by the Italian region where spent their social distancing period, are reported.

As shown in Table 3, the total answers collected were not geographically distributed in an even way. With 60.5% of the participants the most represented Italian region was Piemonte (1989), followed by Lombardia (278), Lazio (243), Emilia Romagna (170), and Campania (113). Fewer answers were obtained from other Italian regions. Some of them were represented by less than 10 respondents: Abruzzo (8), Basilicata (8) and Molise (2).

Respondent average age was 44.8 years, with 65% of respondents between 30 and 60 years old, and 20.9% between 18–30 years. A smaller participation of people >60 years (14.7%) might be due to their less familiarity with social networks and general internet usage.

Table 3. Respondent age classes and gender within Italian regions where they spent their social distancing period (questions 1, 2, and 5).

	Respondents (1) (n°)	Age Range (2) (%)				Gender (5) (%)		
		18–30	31–45	46–60	>60	M	F	Other
Piemonte	1989	20	30	35	15	34.3	65.5	0.2
Lombardia	278	29.1	32.4	27.3	11.2	43.5	55.8	0.7
Lazio	243	10	36	36	18	24.3	75.7	0
Emilia Romagna	170	20.6	33.5	33.5	12.4	37.6	61.8	0.6
Campania	113	14	26	40	20	39.8	59.3	0.9
Veneto	92	25	30	33	12	37	62	1
Liguria	84	29.8	38.1	21.4	10.7	22.6	76.2	1.2
Sicilia	65	25	15	45	15	44.6	55.4	0
Toscana	57	25	25	35	16	42.1	57.9	0
Friuli Venezia Giulia	38	42.1	18.4	26.3	13.2	34.2	63.2	2.6
Sardegna	36	19	47	19	14	47.2	52.8	0
Puglia	28	21	29	46	4	60.7	39.3	0
Calabria	17	6	24	53	18	47.1	52.9	0
Marche	15	13	40	27	20	13.3	86.7	0
Trentino Alto Adige	15	33.3	46.7	20	0	6.7	93.3	0
Umbria	14	21	43	29	7	50	50	0
Valle d'Aosta	14	28.6	28.6	35.7	7.1	36	64	0
Abruzzo	8	25	25	50	0	50	50	0
Basilicata	8	13	38	38	13	37.5	62.5	0
Molise	2	50	50	0	0	50	50	0
Total respondents	3286	20.9	30.6	33.8	14.7	35.2	64.5	0.3

Concerning gender distribution, females represented 64.5% of total respondents and were the principal sample in almost all Italian regions, except Puglia where the percentage of male respondents was higher (60.7%), and Abruzzo, Molise, and Umbria where the percentage among gender was evenly distributed (50%).

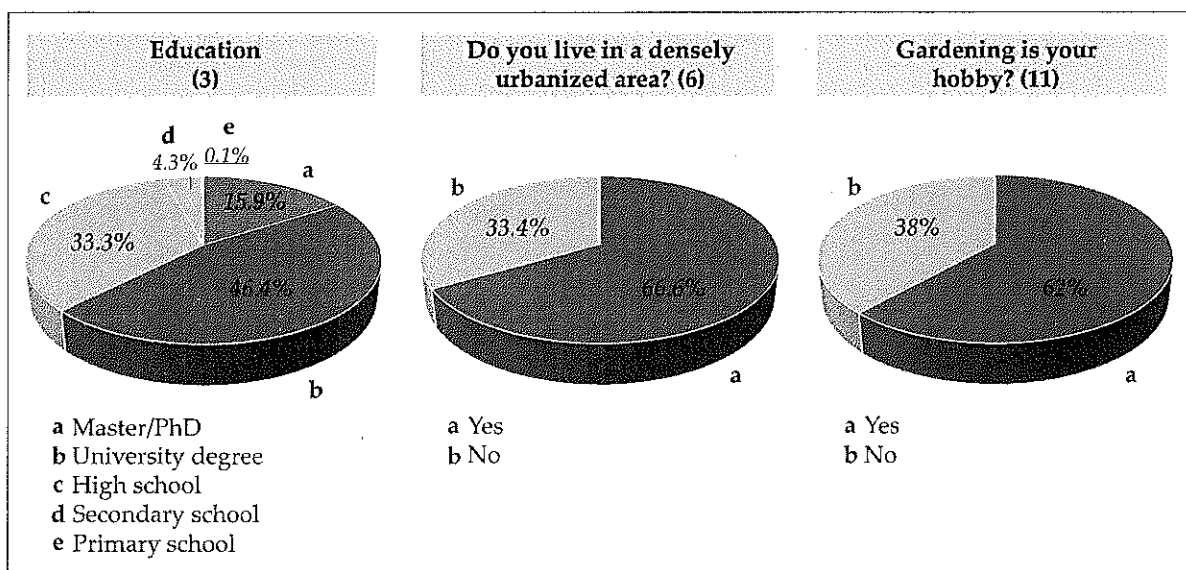In Figure 1, graphics with percentages of answers related to respondent characteristics are shown.

Figure 1. Respondents' characteristics (questions 3, 6, and 11).

As shown in Figure 1, the respondent level of education was medium–high, because over half of respondents (62.3%) had a university education. People living in urbanized areas (66.6%) were the most representative of total respondents and in line with Italian region characteristics, i.e., Valle d'Aosta (29%) and Trentino Alto Adige (33%) are effectively less urbanized than Piemonte (71%) or Lazio (79%). The majority of respondents declared that gardening was their hobby (62%). These data are in line with Groves et al. [34], who demonstrated the role of survey topic interest, principally those who consider the study interesting will respond.

In Figure 2, habits and preferences about the use of public green areas before the social distancing period are shown.

Regarding habits before the social distancing period, Figure 2 shows that the majority of respondents (81%) used to frequent city public green areas once a week (31%), three times a week (26%) or everyday (24%). Among those who frequented them, the primary reasons were walking alone (28.6%), doing physical activity (24.6%), walking with children (19.4%), walking the dog (11.8%), meeting friends (8%), and doing other activities (7.6%). Trees were the respondent's favorite elements (61%), followed by lawns (25%), flowers (8%), and animals (6%).

In Figure 3 the percentages of answers about respondent perceptions of public green areas during the social distancing period are reported.
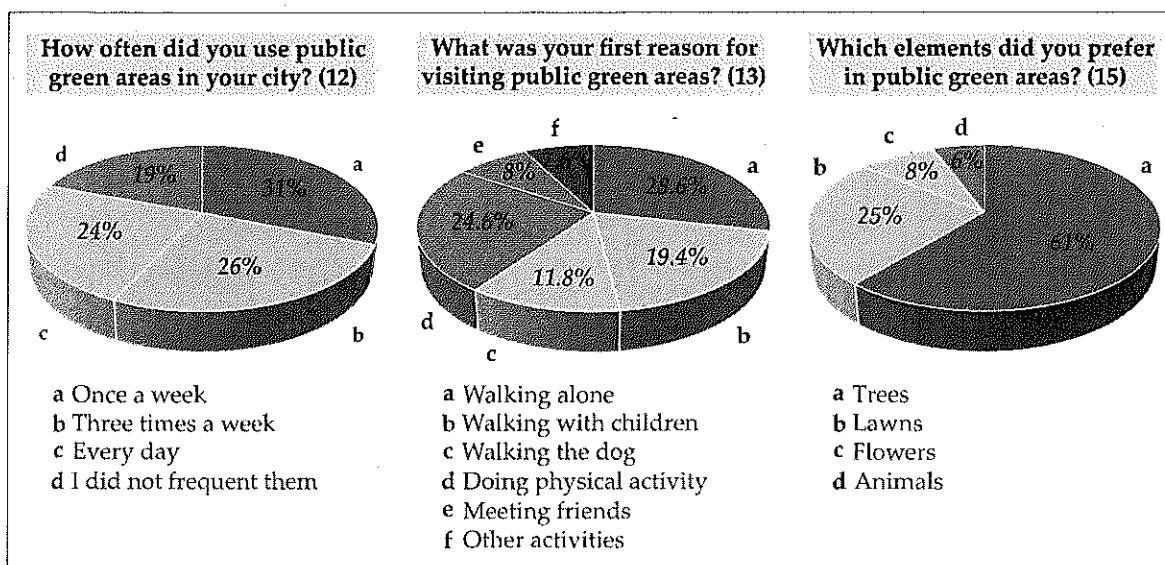

Figure 2. Habits and preferences about the use of public green areas before the social distancing period (questions 12, 13, and 15).

The data showed that the social distancing period influenced perceptions of public green areas. Indeed, as shown in Figure 3, 70.8% of respondents during this period had a recurrent (47.5%) or pressing (23.3%) physical/psychological need for green areas. In addition, 59% reported an increased interest. Only for 1% had less interest, while for 40% the interest remained unchanged. The activities most missed were carrying out usual activities (32%), and seeing flowers (29.5%), probably due to the spring period when many landscape shrubs are in bloom. Furthermore, respondents missed enjoying the shade of the trees (18%), seeing people (7%) and animals (5%). About 8.5% of respondents missed other aspects not listed in the question. Finally, 85.6% believed that gardening activity linked to plant cultivation could be useful to maintain an adequate psychophysical level.

Considering the respondents perceptions during the social distancing period, more than half of (53%) said that at the end of the social distancing period they would go to public green areas more frequently, 22% said they would not, and 25% did not know. In

addition, 52.8% had the intention to become volunteers to maintain green areas near their homes at the end of the social distancing period. Surprisingly, many of them had never done it before (38.3%). Only 0.9% had been a volunteer for public green area maintenance before the social distancing period but will not do so after. Finally, asked about what would be the first place where they wish to go at the end of lockdown, respondents said public green areas (67.7%), following by other places not listed (20.7%), cinema (5.5%), gym (4.8%), and only 1.3% shopping centers.
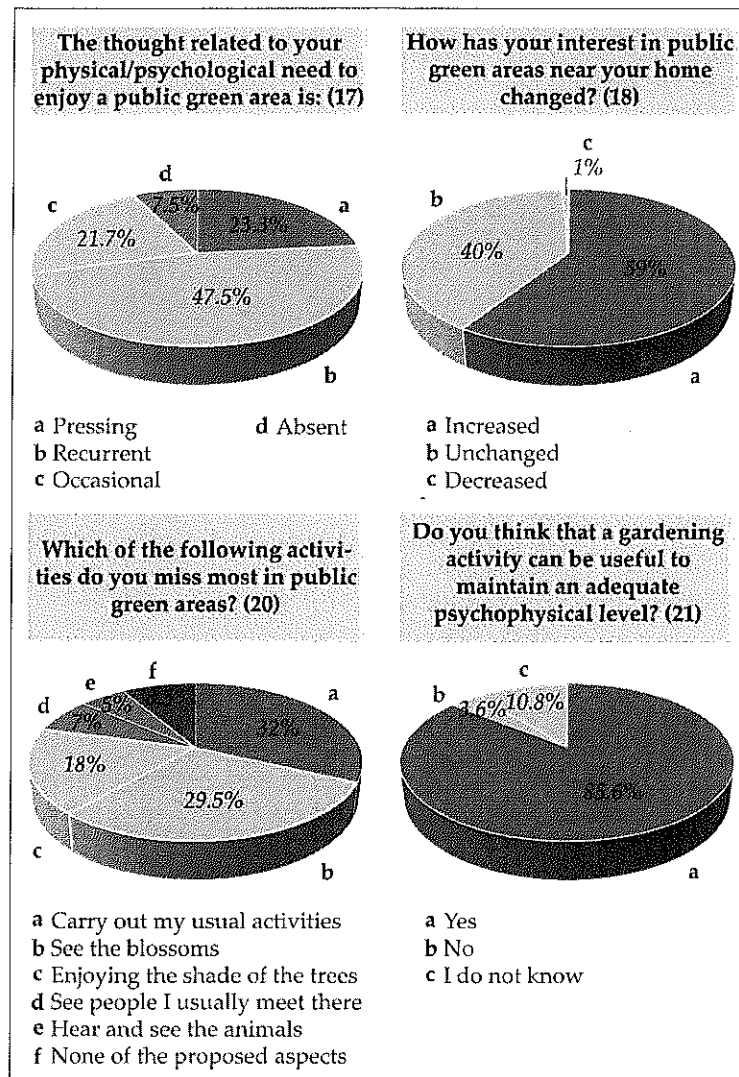
Figure 3. Perception of public green areas during the social distancing period (questions 17, 18, 20, and 21).

In Figure 4, respondents indicated that their potential use of green spaces and habits after the social distancing period may change.

3.2. The Piemonte Case Study

In total, 1989 respondents spent their social distancing period in Piemonte. In Table 4, results of the chi-square test are shown, based on this part of the sample. For the questions for which the chi-square test indicated a relationship, Correspondence analyses (CA) were performed. In Table 4, the most significant CA factors are also reported.
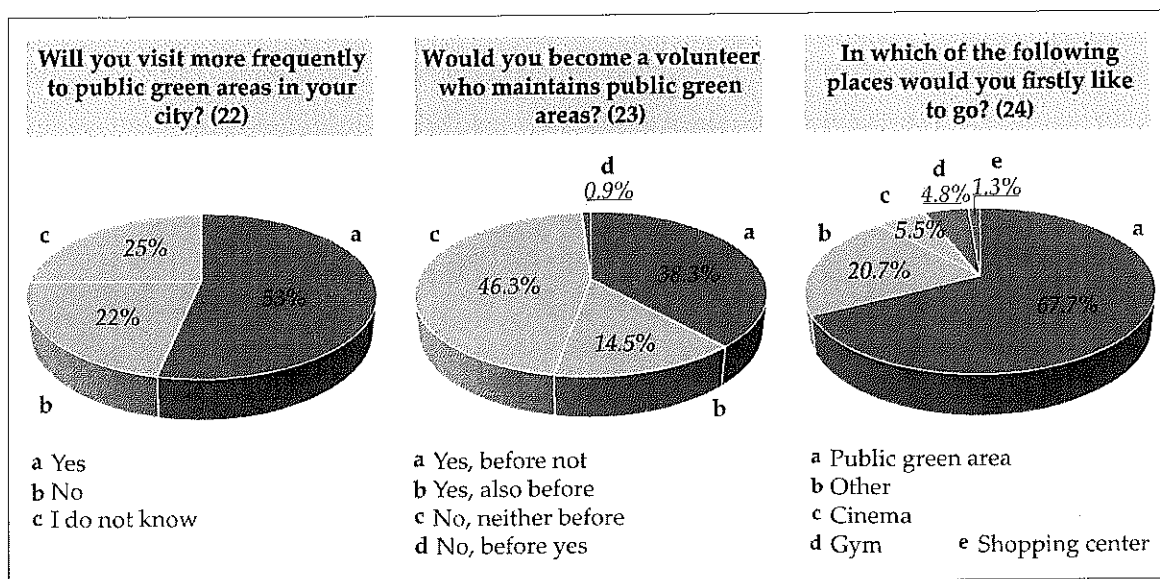
Figure 4. Potential use of green spaces and change of habits after the social distancing period (questions 22, 23, and 24).

Table 4. Chi-square test and correspondence analysis results regarding questions selected.

Couples of Questions	Chi-Square Test (p value)	Correspondence Analysis (Significant CA?)
1–17	0.007893 *	No
1–18	0.2813	-
1–21	0.009447 *	No
1–22	0.004089 *	No
2–17	0.04914 *	Yes
2–18	0.0008343 *	No
2–21	0.0005175 *	No
2–22	1.267×10^{-7} *	No
3–18	0.0001627 *	No
3–21	0.2106	-
6–17	$<2.2 \times 10^{-16}$ *	No
6–18	5.967×10^{-9} *	No
7–17	1.468×10^{-5} *	No
7–18	0.5344	-
7–19	2.2×10^{-16} *	No
10–17	0.3911	-
10–18	0.02707 *	No
12–17	$<2.2 \times 10^{-16}$ *	Yes
12–18	4.049×10^{-11} *	No
12–22	$<2.2 \times 10^{-16}$ *	No
15–20	$<2.2 \times 10^{-16}$ *	Yes
16–17	$<2.2 \times 10^{-16}$ *	Yes
16–18	1.43×10^{-10} *	Yes
16–22	2.433×10^{-10} *	Yes

* Statistically significant ($p < 0.05$).

As shown in Table 4, the chi-square test indicated the presence or absence of a relationship between answers obtained by different question pairs. The respondent age range (1) was related to the physical/psychological need to enjoy a public green area (17), but not with changes of interest about them (18). Gender (2) was related to/associated with both the needs (17) and the interest (18). Indeed, the CA factor map (Figure 5) shows that during the social distancing period females had a more recurrent physical/psychological need to enjoy a public green area than males. This confirms a greater sensibility of women on the topic.
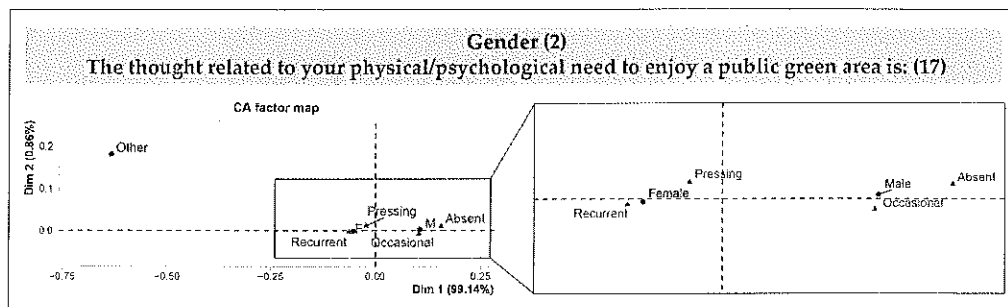
Figure 5. CA results for the relationship between the respondent characteristics (gender) and their public green area perceptions during the social distancing period (questions 2–17). On the right of the figure there is an expansion of the CA factor map.

Figure 3 was related to interest typology (18), but it was not with the thinking that a gardening activity could be useful to achieving/maintaining an adequate psychophysical level (21). However, this last question was related to respondent age range (1) and gender (2). Age range (1) and gender (2) were also related to the potential for more frequent use of public green areas after the social distancing period (22). The typology of areas (urbanized or not) where respondents lived (6) and the presence of a public green area within maximum 200 m from their home (7) were both related with the need typology (17). The chi-square test also suggested that the typology of areas (6) was related with the changes of interest (18), but the need typology (7) was not. Answers to question 7 were also related to the availability to move homes at the end of the lockdown period to have green spaces nearby (19). The presence of pets in-respondent homes that needed to go out daily (10) (one of the few reasons why it was possible to go out of the house) was not related with the typology of need (17), but it was with the increased, decreased or unchanged interest about public green areas near the home (18). The frequency with which respondents enjoyed the public green areas in their cities before the lockdown (12) was related to the need typology (17), the changes of interest (18) and the potential for more frequent use of them at the end of the social distancing period (22). The CA factor map (Figure 6) illustrates that the relationship between the respondents' public green area frequency of use before the social distancing period and the need for them during the period was particularly evident among people who had previously frequented these areas more often. Indeed, the thoughts related to the physical/psychological need to enjoy a public green areas during the lockdown period were pressing for respondents who used to go daily, while it was absent for people that never frequented them. For respondents that used to frequent them three times a week, the need was more recurrent than for those who frequented them once a week.
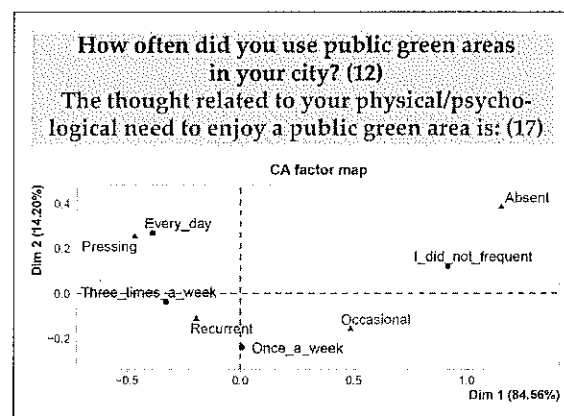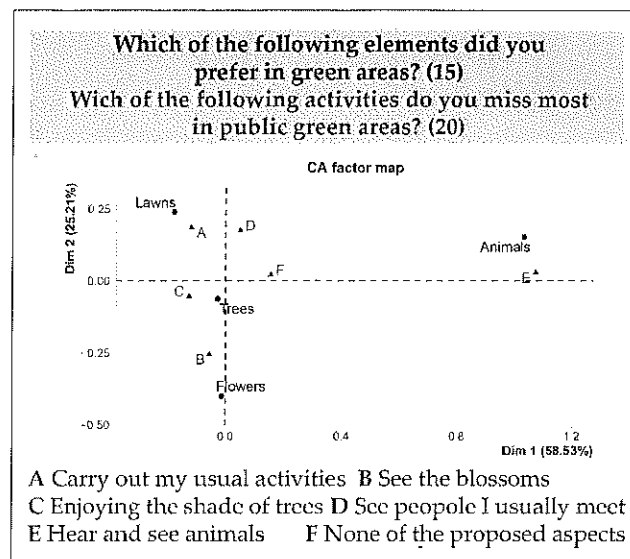

Figure 6. CA results for the relationship between the respondent use of public green areas and favorite elements before the social distancing period and the perception about them during social distancing (questions 12–17).

The chi-square test indicated a relationship between the favorite elements of public green areas before the period (15) and the activity that was missed the most during the lockdown (20). The CA factor map (Figure 7) shows, for example, that those who preferred animals missed most hearing and seeing animals. To those who missed carrying out their activities in public green areas the most before the period preferred lawns, probably because they usually carried out their activities using them.

Figure 7. CA results for the relationship between the respondent use of public green areas and favorite elements before the social distancing period and the perception about them during social distancing (questions 15–20).

The chi-square test also showed a relationship between the outdoor spaces that respondents could use during the social distancing period (16) with the need typology (17) and interest changes (18). The CA factor maps (Figure 8) highlight the importance of having a green space one is able to use. Indeed, respondents that had no other outdoor space available during the social distancing period had a pressing physical/psychological need to enjoy a public green area. However, the need was absent for those who had a private garden. For the other situations of availability, the thought was more recurrent. The interest about public green areas increased more between who had no outdoor spaces, private terraces or residential courtyards (without greenery).
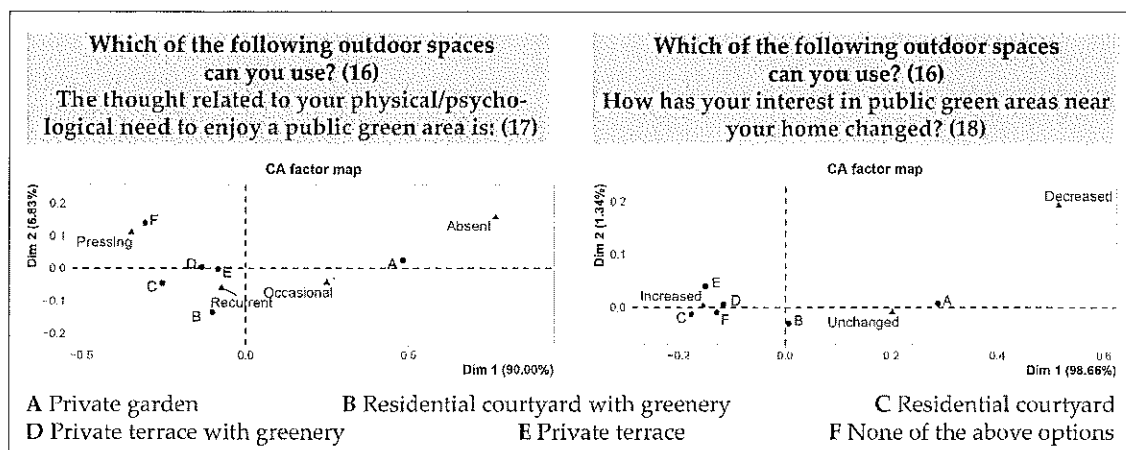

Figure 8. CA results for the relationship between the respondent outdoor space availability and the public green area perceptions during the social distancing period (questions 16–17 and 16–18).

Finally, the chi-square test suggested that respondent outdoor space availability during the lockdown (16) was related to the potential more frequency of use of public green areas after the social distancing period (22). In particular, the CA factor map (Figure 9) shows that the behavior of respondents who had no outdoor spaces or a communal courtyard (without greenery) and people who had a private garden probably were opposite. This last category will not more frequently visit public green areas of its city, and those who had a communal courtyard with greenery were more undecided.
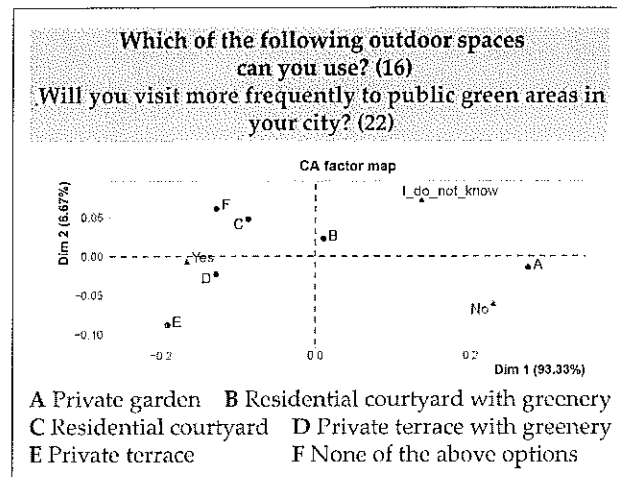

Figure 9. CA results for the relationship between the respondent outdoor space availability during the social distancing period and their potential use of public green areas after the period (questions 16–22).

4. Discussion

These results were certainly interesting in outlining the perceptions and needs of the population during the first lockdown phase for control of COVID-19. It was evident that more than 70% of the respondents felt the need to use green areas, in some cases even urgently (Figure 3). Moreover, the potential for becoming a volunteer to contribute to maintaining green areas near their homes (such as in the context of a time bank) was a measure of their increase in interest about the topic. In our research, female respondents represented 64.5% of the sample. The respondent distribution among gender was in line with reports that suggest that women have a greater sensibility toward environmental themes [35]. The restrictions imposed by COVID-19 in Italy also strongly influenced the population perceptions of urban green areas, with a consequent increase in general interest in such spaces. This need was probably also due to the time period in which the first lockdown began in Italy, i.e., spring, when more pleasant temperatures and the beginning of the flowering season may have increased the need for green spaces. In addition, it was possible to see how respondents associated a feeling of psychophysical wellbeing with green areas and in particular with gardening activities linked to plant cultivation. Furthermore, one out of two respondents stated that they would like to use urban green spaces much more frequently at the end of the lockdown. These results at a national level were confirmed by an international study that analyzed several European countries, including Italy and Spain, during the same period of time, showing that in the first lockdown green areas and their use were strongly missed by the population [19]. However, it should be noted that this first analysis confirms a trend that had already existed before such a dramatic event as the COVID-19 pandemic, since the benefits that green areas bring to the population are numerous. Moreover, in 2017, the Word Health Organization (WHO) stressed the importance of urban green areas of all types and sizes in providing environmental, social and health benefits and highlighted the need to plan interventions to implement green areas and make them more accessible to all [36].

In addition to providing a general overview of urban green area perception during the social distancing period for COVID-19 containment in Italy, the research had a specific focus on one Italian region, Piemonte. This region is located on the border with France and Switzerland, and recorded, as unfortunately also occurred in many other areas of northern Italy, a high rate of COVID-19 positivity. It should be remembered that during the first lockdown in Italy, anxiety and fear were high and there was no clear prediction of when and how this situation could have been eased. In addition, there were very few reasons allowed for leaving the house and citizens had to stay within a distance of 200 m from home.

Specifically, the focus on Piemonte clearly highlighted three main results: the relationship between the need and the frequency of use of green areas; the need to use urban green areas and the availability of green spaces near one's home; and, the need to use urban green areas and their availability within a distance of 200 m from home.

In particular, data showed that the respondents need to use green areas was linked to their previous frequency of use, with those who used them almost every day having a greater need than those who used them less. This initial result indicated that, for many respondents, green areas were a necessary daily living space that became difficult to use during the lockdown period, which probably amplified this need.

The results obtained from this research also showed how a potential change in the habits related to the use of public green areas after the period of social isolation can follow/take place/could be an outcome. The potential change was linked to the outdoor spaces explored during the lockdown period. In particular, there was a greater need to use urban green spaces by those respondents who did not have outdoor green spaces in their homes. This result, therefore, underlined how, as the availability of green spaces in the home decreases, the need and desire to use and benefit from urban green areas increases considerably. In addition, respondents in Piemonte highlighted that the lack of urban green areas within a 200 m radius of their homes led them to think about modifying/updating/improving their homes in order to use a green space more easily. These results clearly showed that future planning strategies are needed to meet the needs of citizens by increasing the number of green areas in urban areas as much as possible to provide benefits to wellbeing, with specific reference to cultural ecosystem services, and for having more livable cities.

The role of urban green areas and vegetation, thus seem to play a very important role in the wellbeing of citizens, and not only from a psychological/perceptual point of view [37,38]. In fact, other studies conducted in the same time frame showed that a high amount of green space per capita can play a beneficial role in reducing the harmful effects of the pandemic [39–42]. In particular, a study conducted in several Italian regions, hypothesized that some regions in southern Italy were less affected by the pandemic during the first lockdown, since the pro-capita value of forest area was higher (≥ 0.34 ha/inhabitant) than the most affected regions in the north (<0.20 ha/inhabitant), which also have a lower amount of non-deciduous vegetation [16]. Finally, a study conducted in the United States quantitatively demonstrated that vegetation plays an important role in reducing the transmission of COVID-19, and especially that as urban vegetation increased by 1%, the number of cases of COVID-19 decreased by 2.6% [43]. Green areas therefore also seem to increase the resilience of cities to health emergencies.

Our research showed a strong need for urban green areas among respondents and an increased interest in such green spaces. Although it is possible to see evidence of changes in public perception of urban green areas, these changes may not be momentary, returning later to previous models when the pandemic ends [44].

5. Conclusions

This study supports the hypothesis that the need to use green spaces increased significantly during the first lockdown in Italy, thus changing citizens' perceptions of green spaces near their homes. The benefits to wellbeing and cultural ecosystem services in general

provided by urban green spaces thus seem to be strongly perceived by the population, especially in periods of social and spatial distancing. From the analysis of our results it can be concluded that currently, and because of the COVID-19 led restrictions, the need for green areas has become increasingly recognized. In addition, our study provides evidence about the uses and perceptions related to public green areas before and during the first period of social isolation for COVID-19 restrictions in Italy and in the Piemonte region of Italy.

This research also illustrated the usefulness of stakeholder involvement in monitoring changes in the need and perception of green spaces that can modify the urban ecosystem by influencing planning policies in order to ensure greater wellbeing for citizens. It is therefore important to act quickly while awareness of these issues is still high, by encouraging long-term changes, for example through environmental education activities and supporting projects aimed at increasing ecological connections and the use of nature-based solutions. We think that in this period affected by the pandemic, the involvement of different stakeholders should be considered a priority for acquiring information to then set up specific communication activities and environmental and biodiversity conservation policies that are in line with the recently adopted European Union (EU) Biodiversity Strategy for 2030. In this perspective future research should be aimed at a multidisciplinary analysis of the relationship between urban green spaces and public wellbeing involving different stakeholders, following WHO [36] findings on green spaces and health benefits addressing the goals set by the EU Biodiversity Strategy for 2030. The vision is therefore to make our cities more resilient, ecologically sustainable and livable, and inhabited by citizens who are more sensitive and aware of environmental topics.

References

1. Agenda 2030—United Nations Regional Information Centre. Available online: https://unric.org/it/agenda-2030/ (accessed on 5 May 2020).
2. Battisti, L.; Corsini, F.; Gusmerotti, N.M.; Larcher, F. Management and Perception of Metropolitan Natura 2000 Sites: A Case Study of La Mandria Park (Turin, Italy). *Sustainability* **2019**, *11*, 6169. [CrossRef]
3. Rupprecht, C.D.D.; Byrne, J.A.; Ueda, H.; Lod, A.Y. 'It's real, not fake like a park': Residents' perception and use of informal urban green-space in Brisbane, Australia and Sapporo, Japan. *Landsc. Urban Plan.* **2015**, *143*, 205–218. [CrossRef]
4. Colding, J.; Barthel, S. The potential of 'Urban Green Commons' in the resilience building of cities. *Ecol. Econ.* **2013**, *86*, 156–166. [CrossRef]
5. Ferreira, A.J.D.; Pardal, J.; Malta, M.; Ferreira, C.S.S.; Soares, D.D.J.; Vilhena, J. Improving Urban Ecosystems Resilience at a City Level. The Coimbra Case Study. *Energy Procedia* **2013**, *40*, 6–14. [CrossRef]
6. Meerow, S.; Newell, J.P. Spatial planning for multifunctional green infrastructure: Growing resilience in Detroit. *Landsc. Urban Plan.* **2017**, *159*, 62–75. [CrossRef]
7. Shackleton, C.M.; Blair, A. Perceptions and use of public green space is influenced by its relative abundance in two small towns in South Africa. *Landsc. Urban Plan.* **2013**, *113*, 104–112. [CrossRef]
8. Dymen, C.; Andersson, M.; Langlais, R. Gendered dimensions of climate change response in Swedish municipalities. *Local Environ.* **2013**, *18*, 1066–1078. [CrossRef]

9.   Battisti, L.; Pomatto, E.; Larcher, F. Assessment and Mapping Green Areas Ecosystem Services and Socio-Demographic Characteristics in Turin Neighborhoods (Italy). *Forests* **2020**, *11*, 25. [CrossRef]

10. Cicea, C.; Pirlogea, C. Green Spaces and Public Health in Urban Areas. *Theor. Empir. Res. Urban Manag.* **2011**, *6*, 83–92.

11. Tzoulas, K.; Korpela, K.; Venn, S.; Yli-Pelkonen, V.; Kazmierczak, A.; Niemela, J.; James, P. Promoting ecosystem and human health in urban areas using Green Infrastructure: A literature review. *Landsc. Urban Plan.* **2007**, *81*, 167–178. [CrossRef]

12. Nielsen, T.S.; Hansen, K.B. Do green areas affect health? Results from a Danish survey on the use of green areas and health indicators. *Health Place* **2007**, *13*, 839–850. [CrossRef]

13. Richardson, E.A.; Pearce, J.; Mitchell, R.; Kingham, S. Role of physical activity in the relationship between urban green space and health. *Public Health* **2013**, *127*, 318–324. [CrossRef]

14. Cohen, D.A.; Han, B.; Derose, K.P.; Williamson, S.; Marsh, T.; Rudick, J.; McKenzie, T.L. Neighborhood poverty, park use, and park-based physical activity in a Southern California city. *Soc. Sci. Med.* **2012**, *75*, 2317–2325. [CrossRef]

15. Ma, A.T.H.; Lam, T.W.L.; Cheung, L.T.O.; Fok, L. Protected areas as a space for pandemic disease adaptation: A case of COVID-19 in Hong Kong. *Landsc. Urban Plan.* **2021**. [CrossRef]

16. Roviello, V.; Roviello, G.N. Lower COVID-19 mortality in Italian forested areas suggests immunoprotection by Mediterranean plants. *Environ. Chem. Lett.* **2020**. [CrossRef]

17. Venter, Z.S.; Barton, D.N.; Gundersen, V.; Figari, H.; Nowell, M. Urban nature in a time of crisis: Recreational use of green space increases during the COVID-19 outbreak in Oslo, Norway. *Environ. Res. Lett.* **2020**, *15*, 104075. [CrossRef]

18. Amerio, A.; Brambilla, A.; Morganti, A.; Aguglia, A.; Bianchi, D.; Santi, F.; Costantini, L.; Odone, A.; Costanza, A.; Signorelli, C.; et al. COVID-19 Lockdown: Housing Built Environment's Effects on Mental Health. *Int. J. Environ. Res. Public Health* **2020**, *17*, 5973. [CrossRef]

19. Ugolini, F.; Massetti, L.; Calaza-Martínez, P.; Cariñanos, P.; Dobbs, C.; Ostoic, S.K.; Marin, A.M.; Pearlmutter, D.; Saaroni, H.; Šaulienė, I.; et al. Effects of the COVID-19 pandemic on the use and perceptions of urban green space: An international exploratory study. *Urban For. Urban Green* **2020**, *56*, 1–9. [CrossRef] [PubMed]

20. Uchiyama, Y.; Kohsaka, R. Access and Use of Green Areas during the COVID-19 Pandemic: Green Infrastructure Management in the "New Normal". *Sustainability* **2020**, *12*, 9842. [CrossRef]

21. De la Barrera, F.; Reyes-Paecke, S.; Harris, J.; Bascuñán, D.; Farías, J.M. People's perception influences on the use of green spaces in socio-economically differentiated neighborhoods. *Urban For. Urban Green* **2016**, *20*, 254–264. [CrossRef]

22. Jim, C.Y.; Chen, W.Y. Perception and Attitude of Residents toward Urban Green Spaces in Guangzhou (China). *Environ. Manag.* **2006**, *38*, 338–349. [CrossRef] [PubMed]

23. Balram, S.; Dragi´cevi´c, S. Attitudes toward urban green spaces: Integrating questionnaire survey and collaborative GIS techniques to improve attitude measurements. *Landsc. Urban Plan.* **2005**, *71*, 147–162. [CrossRef]

24. Kothencz, G.; Blaschke, T. Urban parks: Visitors' perceptions versus spatial indicators. *Land Use Policy* **2017**, *64*, 233–244. [CrossRef]

25. Schetke, S.; Qureshi, S.; Lautenbach, S.; Kabisch, N. What determines the use of urban green spaces in highly urbanized areas?—Examples from two fast growing Asian cities. *Urban For. Urban Green* **2016**, *16*, 150–159. [CrossRef]

26. Yen, Y.; Wang, Z.; Shi, Y.; Xu, F.; Soeung, B.; Sohail, M.T.; Rubakula, G.; Juma, S.A. The predictors of the behavioral intention to the use of urban green spaces: The perspectives of young residents in Phnom Penh, Cambodia. *Habitat Int.* **2017**, *64*, 98–108. [CrossRef]

27. Nederhof, A. Methods of coping with social desirability bias: A review. *Eur. J. Soc. Psychol.* **1985**, *15*, 263–280. [CrossRef]

28. ISTAT—Istituto Nazionale di Statistica. Available online: http://dati.istat.it/Index.aspx?QueryId=18540 (accessed on 14 November 2020).

29. Migliaretti, G.; Dalmasso, P.; Gregori, D. Air pollution effects on the respiratory health of the resident adult population in Turin, Italy. *Int. J. Environ. Health Res.* **2007**, *17*, 369–379. [CrossRef]

30. Romanazzi, V.; Casazza, M.; Malandrino, M.; Maurino, V.; Piano, A.; Schilirò, T.; Gilli, G. PM10 size distribution of metals and environmental-sanitary risk analysis in the city of Torino. *Chemosphere* **2014**, *112*, 210–216. [CrossRef] [PubMed]

31. Bono, R.; Romanazzi, V.; Bellisario, V.; Tassinari, R.; Trucco, G.; Urbino, A.; Cassardo, C.; Siniscalco, C.; Marchetti, P.; Marcon, A. Air pollution, aeroallergens and admissions to pediatric emergency room for respiratory reasons in Turin, northwestern Italy. *BMC Public Health* **2016**, *16*, 722. [CrossRef] [PubMed]

32. McHugh, M.L. The Chi-square test of independence. *Biochem. Med. (Zagreb)* **2013**, *23*, 143–149. [CrossRef] [PubMed]

33. Correspondence Analysis—FactomineR. Available online: http://factominer.free.fr/factomethods/correspondence-analysis.html (accessed on 3 September 2020).

34. Groves, R.M.; Presser, S.; Dipko, S. The Role of Topic Interest in Survey Participation Decisions. *Public Opin. Q.* **2004**, *68*, 2–31. [CrossRef]

35. Jackson, C. Doing what comes naturally? Women and environment in development. *World Dev.* **1993**, *21*, 1947–1963. [CrossRef]

36. X. WHO—Urban Green Space Interventions and Health: A Review of Impacts and Effectiveness. Full Report. 2017. Available online: https://www.euro.who.int/en/health-topics/environment-and-health/urban-health/publications/2017/urban-green-space-interventions-and-health-a-review-of-impacts-and-effectiveness.-full-report-2017 (accessed on 11 February 2021).

37. Hofmann, M.; Westermann, J.R.; Kowarik, I.; Vand der Meer, E. Perceptions of parks and urban derelict land by landscape planners and residents. *Urban For. Urban Green* **2012**, *11*, 303–312. [CrossRef]

38. Riechers, M.; Barkmann, J.; Tscharntke, T. Perceptions of cultural ecosystem services from urban green. *Ecosyst. Serv.* **2016**, *17*, 33–39. [CrossRef]
39. Kavaliunas, A.; Ocaya, P.; Mumper, J.; Lindfeldt, I.; Kyhlstedt, M. Swedish policy analysis for Covid-19. *Health Policy Technol.* **2020**, *9*, 598–612. [CrossRef] [PubMed]
40. Lindström, M. The COVID-19 pandemic and the Swedish strategy: Epidemiology and postmodernism. *SSM—Popul. Health* **2020**, *11*, 100643. [CrossRef] [PubMed]
41. Douglas, I.; Champion, M.; Clancy, J.; Haley, D.; Lopes de Souza, M.; Morrison, K.; Scott, A.; Scott, R.; Stark, M.; Tippett, J.; et al. The COVID-19 pandemic: Local to global implications as perceived by urban ecologists. *Socio Ecol. Pract. Res.* **2020**, *2*, 217–228. [CrossRef]
42. Coronavirus: Urban parks can be a lifeline—If we respect lockdown rules. Conversation. Available online: https://theconversation.com/coronavirus-urban-parks-can-be-a-lifeline-if-we-respect-lockdown-rules-134185 (accessed on 2 December 2020).
43. You, Y.; Pan, S. Urban Vegetation Slows Down the Spread of Coronavirus Disease (COVID-19) in the United States. *Geophys. Res. Lett.* **2020**, *47*. [CrossRef]
44. Rousseau, S.; Deschacht, N. Public Awareness of Nature and the Environment during the COVID-19 Crisis. *Environ. Resour. Econ.* **2020**, *76*, 1149–1159. [CrossRef] [PubMed]