Research Article

Luigi Maffei, Massimiliano Masullo, Chiara Bartalucci*, Arnaldo Melloni, and Raffaella Bellomini

Pockets of quiet characterization in the historical center of Florence (Italy)

https://doi.org/10.1515/noise-2022-0162
Received Nov 07, 2022; accepted Dec 29, 2022

Abstract: Due to the difficulty of accessing quiet urban areas as defined by the EU Directive 2002/49/EC and of designing new ones, especially in the historical centers, it becomes more and more important to recognize pockets of quiet which can provide visitors with time for their physical and mental restoration. To this aim, an investigation methodology has been developed in previous studies conducted in Naples (Italy), Istanbul (Turkey) and Murcia (Spain) focused on finding and characterization of alternative quiet spaces which could offer opportunities to rest from the surrounding noise, which highlighted the role of non-auditory aspects on the restorativeness of urban spaces, such as green and water elements, or of historic and cultural value. This methodology which includes objective and subjective assessment has been used to characterize and illustrate the potentialities of the existing and potential spaces for restoration within the ancient center of the city of Florence (Italy). Concerning acoustic measurements, the "quietness" is confirmed by the fact that the differences between the sound levels (LAeq) of the surrounding areas and those within selected sites is greater than 9 dB; while the outcomes of the survey confirm the expectations especially concerning the importance and relevance, the cultural value, the historical-artistic elements, the perceived sense of being away and the distinction with the external acoustic environment.

Keywords: Quiet areas; restorativeness, acoustics, tourist paths; cultural elements; soundwalks; expert analysis

1 Introduction

The harmful impacts of noise exposure have long been documented, especially within urban environments [1]. As an illustration, in most European countries, more than 50% of inhabitants within urban areas are exposed to road noise levels which are associated with adverse effects on health, including sleep disturbances, hypertension, cardiovascular diseases, impaired cognitive function and stress [2]. Furthermore, the concerns related to the effects of noise exposure on people's health and quality of life are increasing because of rapid urbanization.

In cities, quiet public areas could offer relief to people since they are spaces free from unwanted and unhealthy sounds that ensure access to quietness and associated physiological and psychological benefits [3–5]. Studies have shown that quiet spaces are beneficial for the well–being of residents but also of regular visitors [6]. In recent years, the identification, assessment and planning of quiet zones within urban contexts have received increasing scholarly attention; also, making them available has become one of the priority goals of governments and agencies concerned with mitigation of noise pollution (and its effects) and urban sustainability [7, 8]. Mixed methodologies, integrating qualitative and quantitative approaches, have been used to analyze and evaluate those areas [9].

It is growingly acknowledged that non-acoustical features characterizing quiet areas, such as visual aspects and the presence of vegetation [10] and water [11], may interact with auditory subjective perception. Several studies have shown that even in those parks where sound pressure level is higher than the limits commonly used to define quiet areas, soundscape is often considered as "good" or "excellent" by park's users [12]. Consequently, a holistic approach that goes beyond the assessment of the acoustic levels and their subjective perception and addresses also other variables, has been recently preferred to investigate quiet areas [12–

*Corresponding Author: Chiara Bartalucci: Department of Architecture and Industrial Design, Università degli Studi della Campania "Luigi Vanvitelli", Abbazia di S. Lorenzo ad Septimum, Aversa (CE), Italy; Email: chiara.bartalucci@gmail.com
Luigi Maffei, Massimiliano Masullo: Department of Architecture and Industrial Design, Università degli Studi della Campania "Luigi Vanvitelli", Abbazia di S. Lorenzo ad Septimum, Aversa (CE), Italy
Arnaldo Melloni: Direzione Ambiente, Comune di Firenze, via Benedetto Fortini 37, Firenze (FI), Italy
Raffaella Bellomini: Vie en.ro.se Ingegneria s.r.l., viale Belfiore 36, Firenze (FI), Italy

14]. In this line, Kang [15] addressing the concept of quiet areas from the perspective of an urban planner, pointed out that in planning a city a restricted approach aimed at merely reducing the noise level often does not improve quality of life. Additionally, recent contributions have addressed and revisited the concept of quietness itself [16].

Green urban spaces were the focus of the early studies which explored quiet spaces in urban context. The soundscapes of urban parks, gardens and green areas located close to where people live and work have been investigated to (i) understand if and how they deliver a comfortable sound environment and (ii) to shed light on their overall importance for citizens and tourists' quality of life in urban areas [10, 12, 17]. This scholarly interest was also boosted, at European level, by the enactment of the European Noise Directive (Directive 2002/49/EC - END) [18] which on the one side recognized the need to preserve quiet areas as zones with low sound levels where people can have a restorative experience and relief from environmental stress, and on the other side it gives a loose definition of quiet area in an agglomeration and does not provide a detailed methodology to select and manage them. This has caused the proliferation of various and fragmented methods and indicators for their identification [8, 16, 19].

Consequently, scholars have pointed out the need for quiet area designation guidelines which should be sufficiently specific but also leave Member States a certain degree of freedom according to their local context and needs [8].

In addition, in March 2022, the Italian Ministry of Ecological Transition approved Directorial Decree No. 16 dated March 24, 2022 [20], which defines the procedures for identifying and managing quiet zones in an agglomeration and quiet zones in the open countryside. This decree introduces the concept of a "network of quiet zones" for which there are no specific extension requirements, but still constraints on the noise levels occurring and belonging to specific classes of the municipal noise classification plan.

2 Beyond the quietness: restorativeness in urban contexts

To overpass the limitation of the concept of quietness, mainly focused on the reduction and preservation of noise within specific sound limits levels several researchers focused their effort on understanding the role of quiet areas on psychophysical restoration [21–25]. Adopting a broader perspective, a multidisciplinary approach, and new devices and tools supporting more ecological experiments sessions, they tried to fill the limits of the previous research, which failed to consider the quality of the soundscape and other aspects affecting the psychophysical well-being of the individuals.

Starting from Kaplan's Attention Restoration Theory (ART) [26] and, thanks to the use of psychological scales [27–29] developed to measure the magnitude of the restorativeness, they showed as the restorative capability of urban spaces does not only depend on the noise level but is modulated by the physical and not physical factors. In fact, the urban sound environment doesn't only negatively affect the restorativeness of urban spaces, such as for the road traffic noise, but some sounds as water [6, 30] or bird [31, 32] sound, can play a role in mitigating their negative effects [33]. Similar positive effects have also been caused by the presence of green elements (*e.g.*, plants and flowers) [34, 35] and by the combination of both acoustics and visual elements [36, 37]. Not physical factors, instead, are those linked with the aesthetic characteristics [38] or with the cultural value of the places [39, 40].

In historic city centers characterized by dense streets and a peculiar urban configuration, there is often a scarce availability of parks, gardens and classic green areas and the urban fabric limits the implementation of new ones. In city centers of historic towns, the difficulty of accessing quiet urban areas as defined by the EU Directive 2002/49/EC and identified by governments in action plans, is often combined by the presence of crowded touristic paths that add to other source of noise pollution and stress (*e.g.*, traffic noise).

For this reason, scholars have drawn the attention to other type of areas – such as small green spaces [41] other quiet spaces such as cloisters and courts of ancient buildings and churches [42] or widenings [43] with potential restorative effects. For example, focusing on the historical city center of Naples, Maffei *et al.* [44] have shown that the cloisters and the courts of ancient and historic palaces and cloisters of monasteries have a high potential to provide a restorative experience to residents and tourists, representing a valid alternative to urban green and quiet areas. Particularly, they found that beyond acoustic peculiarities, the historical and cultural elements of the sites can have positive effects on people's perceived restorativeness [45].

Building on these findings, the authors have developed a methodology for the multisensory and multidimensional characterization of peculiar urban quiet areas and tested it in some urban spaces of Naples (Italy), Istanbul (Turkey) and Murcia (Spain) [40, 42–44, 46]. Within this methodology a specific focus is given to the restorativeness potential of the area linked with its cultural features, going beyond

the vegetal component, the presence of natural sounds and the low level of traffic noise.

The main aim of this paper is to add value to the above methodology verifying its applicability to other contexts as the tourist city center of Florence which present specific local peculiarities (*e.g.*, touristic city) and receiving from this application more elements of discussion and analysis.

3 The context of study

According to Eurostat, the city of Florence for the year 2020 ranked 15th among European cities which provided data for nights spent in tourist accommodation establishments by non-residents.

In fact, the applied methodology allows to identify and characterize areas that offers an opportunity to refresh and rest from the surrounding noise and offers a temporary refugee from urban chaos and have the added value of providing cultural and cognitive cues for tourists who are usually directed to the same classic routes, but also for residents who are often unaware of the peculiarities of the places where they live. According to the ISGlobal Ranking of Cities [47], an ongoing project aimed at estimating the health impacts of urban and transport planning in 1000 European cities, the city of Florence ranks 40th in Europe in terms of Normalized Difference Vegetation Index (NDVI) and 180th in terms of % GA (Green Area); while concerning air pollution, Florence ranks 195th in Europe for PM2.5 and 184th for NO_2. Specifically, regarding the Vegetation Index (NDVI), Florence's score is 0.487 which is just above the WHO recommended value (0.455); however, the percentage of Green Area is 41.6% definitively above the WHO recommended value of 25%. Concerning air pollution, the $PM_{2.5}$ is 15.0 μg/m^3, while the WHO recommended annual average value is 5 μg/m^3 and the NO_2 annual mean is 28.1 μg/m^3 against the WHO recommended level of 10 μg/m^3.

Regarding noise pollution, the results reported in the latest update (2021) of the noise mapping of the Florence agglomeration show that, throughout the day, around three quarters of the population living in the Florence agglomeration (63% of residents in the agglomeration) is exposed to noise levels above the 55 dB(A) threshold set by the EU for the strategic noise map in reference to Lden. Noise exposure conditions improve at night, when the percentage of the resident population exposed to levels above the Lnight threshold of 50 dB(A) set by the EU is reduced to just under half of all residents (48% of agglomeration residents). These percentage values are overall lower than those obtained in the previous cycles of the Strategic Acoustic Map of the Florence agglomeration (2014 and 2017), which were respectively 87% and 70% for the Lden indicator and 65% and 54% for the Lnight indicator.

Moreover, if we consider the internationally recommended thresholds not to be exceeded, set at 65 dB(A) for Lden and 55 dB(A) for Lnight, the people exposed are 24% in the day-evening-night period and 27% in the night period, which are also lower than those found in 2014, which stood at 38% and 42% respectively, and in 2017, which stood at 28% and 31% respectively.

4 Methods

The applied method fully complies with the one developed and applied by the authors in some urban spaces of Naples (Italy), Istanbul (Turkey) and Murcia (Spain) [40, 42–44, 46] and mainly consists in the following steps: (i) study cases selection in the city of Florence; (ii) experts analysis; (iii) conducting of acoustic measurements; (iv) soundwalks and binaural registration; (v) administration of questionnaires to assess the perception of the area by the users. Each step of the methodology is illustrated in the following sections.

4.1 Study cases selection

Florence, as a historical city, encloses numerous cloisters, small squares, open spaces, and courtyards that potentially have all the characteristics to be rest areas, i.e., they are public spaces and offer shelter and an opportunity to rest from the busiest and noisiest outdoor areas, as well as providing visitors with historical-cultural or otherwise visual elements that are appealing.

The areas investigated in the current study were selected starting from the study "Firenze Prossima - La Firenze che cambia" conducted by the Municipality of Florence in 2020 in order to know the opinion of the residents and of those who visit it for study or work, starting a listening path on the web, to discuss the city of tomorrow, thus increasing the tools to build the participation phase. Additional considered criteria were the location, within the historic city center, and the proximity to crowded streets.

The location of the six areas chosen, namely the courtyard of Palazzo Strozzi, Palagio di Parte Guelfa, Piazza del Limbo, Cloister of the church of S. Maria Maddalena de' Pazzi, Piazza dei Ciompi, Giardino del Gratta and Giardino di Borgo Allegri, is illustrated in Figure 1.

Figure 1: Localization of study cases in Florence

A short description of the sites under investigation is reported below, while in Figure 2 related photographic material is shown.

1-Courtyard of Palazzo Strozzi (CPS): entrance courtyard of Palazzo Strozzi, a milestone of the Italian Renaissance and one of the most elegant and well-known architectural examples of those prestigious buildings begun to be built in the 15th century, in which a large courtyard surrounded by columns forms the junction where entrances and staircases converge. Initially, the courtyard had functions of representation. Today, it houses temporary exhibitions and is a place to wait for the entrance to Palazzo Strozzi and to rest. During registration, a temporary exhibition was in progress that attracted many visitors.

2-Palagio di Parte Guelfa (PPG): courtyard of one of the oldest and most historically rich palaces in Florence, which was the seat of the so-called 'Guelph party' in the years when the city was divided precisely between Guelphs and Ghibellines. Today, the courtyard in front is mainly used as a meeting and waiting area for the entrance to the main palace and those in front of it. The main source of noise comes from the voices of passers-by.

3-Piazza del Limbo (PL): ancient square in the historical centre of Florence, which opens onto Borgo Santi Apostoli, the street in the historical centre parallel to the Lungarno that connects Piazza Santa Trinita and Por Santa Maria. The square is overlooked by the Church of Santi Apostoli, one of the Florentine churches that has best maintained an early medieval appearance inside. Today it is mostly frequented by tourists whose voices constitute the main source of sound.

4-Cloister of the Church of S. Maria Maddalena de' Pazzi (CCMM): cloister in front of the church of Santa Maria Maddalena de' Pazzi with adjoining convent, an important monumental complex in Florence. Various religious orders and institutions have alternated on this site. Today, the church is frequented especially by the South American community living in Florence. The cloister is mainly frequented by believers and people seeking tranquility and is not affected by any significant source of noise.

5-Piazza dei Ciompi (PC): a square in the historical centre of Florence, about 300 meters north of the basilica of Santa Croce. It houses the Loggia del Pesce, the house of Lorenzo Ghiberti, the National Education Centre and other historical monuments. Today, it is used as an area for refreshments, resting and passage. The main sources of noise come from people's voices and the transit of certain vehicles.

6-Giardino del Gratta (GG): recently redeveloped garden in front of Piazza dei Ciompi. The garden had a lively post-war history and was one of the city's most popular neighborhoods, an expression of Florentine life. It is mainly used for playing, reading, resting, meetings. The main sources of noise come from people's voices and the transit of certain vehicles.

7-Giardino di Borgo Allegri (GBA): The garden is quite unique in the panorama of the city centre, as it originates from the presence of the 'vegetable gardens' of a monastery. Today, the space is managed by an association

Figure 2: Pictures of the selected case studies (from the top-left to the bottom-right: GBA, CPS, CCMM, GG, PC, PL, PPG)

of volunteers, which keeps it open daily and promotes various events, with the aim of offering the district a place for the elderly, young people and children to meet. The main noise sources are those due to children voices.

4.2 Expert analysis

In order to collect a set of information about the area objectively, a 12-item technical datasheet assessing some relevant qualitative aspects of sites was prepared. It investigates the following aspects:

1. Typology (T-S) of the site (CLO-Cloister; CO-Courtyard; SQ-Square; W-Widening; GA-Garden)
2. Dimension (D) of the area (B-Big; M-Medium; S-Small);
3. Presence of Protective Entrances (PE). Entrance with a big door or long arcs/tunnels that can reduce, significantly, the outdoor noise (Y-Yes; N-No);
4. Presence of elements of Cultural and historical Value (CV) (Y-Yes; N-No);
5. Cleanliness (CL) of the site (Y-Yes; N-No);
6. Presence of Green (GE) elements, such as grass or trees (Y-Yes; N-No).

Table 1: Expert's analysis datasheet

Study case	Short coding	T-S	D	PE	CV	CL	GE	BE	SAFE	ACC	T-ACT	I	N.
Courtyard of Palazzo Strozzi	CPS	CO	M (660 m^2)	Y	Y	Y	N	N	Y	Y	Rest, Stop, Waiting for museum entrance	H	10-30
Palagio di Parte Guelfa	PPG	SQ	S (108,5 m^2)	Y	Y	Y	N	N	Y	Y	Entrance to offices and library, passage	M	10
Piazza del Limbo	PL	SQ	S (121 m^2)	Y	Y	Y	N	N	Y	Y	Passage, Entrance to the church	M	10-20
Cloister of the church of S. Maria Maddalena de' Pazzi	CCMM	CLO	M (650 m^2)	Y	Y	Y	Y	N	Y	Y	Visit, inspiration, access to the church	L	<10
Piazza dei Ciompi	PC	SQ	B (2280 m^2)	Y	Y	Y	Y	N	Y	Y	Rest, Passage, Reading	H	30
Giardino del Gratta	GG	GA	M (900 m^2)	Y	N	Y	Y	N	Y	Y	Rest, play, reading	M	10
Giardino di Borgo Allegri	GBA	GA	M (615 m^2)	Y	N	Y	Y	Y	Y	Y	Rest, play, reading	M	15

7. Presence of blue elements (BE) that use water, such as fountains or small basins. (Y-Yes; N-No);
8. Safety (SAFE) of the site (Y-Yes; N-No).
9. Free accessibility (ACC) to the site for visitors, citizens or tourists (Y-Yes; N-No);
10. Typologies of activities (T-ACT) carried out in the site (Free text);
11. Intensity (I) of the activities inside the area (H-High; M-Medium; L-Low);
12. Number of persons (N.) inside the site during the investigation.

Then, all the information listed above have been collected for each area under investigation and reported in Table 1.

4.3 Acoustic measurements, soundwalks and binaural registration

For the acoustics characterization of the sites, the measurement protocol prepared by Maffei *et al.* [44] was used. The protocol defines two kinds of measurements: noise measurements inside each site and along the path from the site toward a near-trafficked road and vice versa (Figure 3), each one recorded twice by a soundwalk. The acoustic recording lasted at least 3 minutes along the paths and more than 4 minutes inside the sites. Additional measurements were carried out inside the sites to adequately describe the spatial and temporal variability of the sound environment of sites.

The measurements were used to compare the sound levels inside the sites and outside up the nearest surrounding trafficked streets.

Acoustic measurements inside the sites were carried out using class 1 sound level meter BRUEL & KJÆR type 2250 equipped with a condenser microphone BRUEL & KJÆR type 4189.

Recordings were carried out by a 4-channel handy recording/playback system Zoom H3 360° VR audio recorder.

Design and administration of questionnaires

To investigate the individual perception of people within the cloister/courtyard, the 4-part Subjective Questionnaire already adopted by Maffei *et al.* in [40, 42–44] was applied. It consists of the following parts:

1. General Information: To collect the main information about the participants, characteristics and motivations;
2. Weinstein Noise Sensitivity Scale (WNSS) [48]: To measure the noise sensitivity of participants;

Figure 3: Example of the soundwalk's path from and to the potential restorative area and of the spot measurement points inside the area

3. Perceived Restorativeness Scale (PRS-11) [29]: To measure the perceived restorativeness of sites and through its components (Fascination, Being Away, Coherence and Scope);

4.1 Qualitative Aspects Questionnaire (QA): to measure how much the participants' experience is influenced by the cultural element;

4.2 Sematic Differential Scale (SD): to measure the connotative meaning which participants give to sites through a series of dichotomic adjectives [49].

The template of the questionnaire is made available in Annex I.

The questionnaire was administered between 10th and 20th May 2022 at the 7 selected sites to sample visitors accepting to fill in. When approaching a visitor, the interviewers informed him/her about the general aspects of the study without revealing its scientific purpose. Participants have also been informed about their right to withdraw consent to participate in the study.

In the same time range of questionnaires' filling by participants, the acoustic measurements were carried out both inside and outside the selected sites. All questionnaires were completed in anonymity by 119 people well distributed on each site.

5 Results

5.1 Analysis of the objective survey

5.1.1 Expert analysis

The observation obtained with the expert analysis (Table 1) indicates that most of the sites are of medium or small dimensions. All of them appear clean and safe. The intensity of the activity is generally medium, and almost all are freely accessible by tourists. Five sites have a marked cultural value. Greenery is present in all the gardens, in Piazza dei Ciompi and in the cloister, but only Giardino di Borgo Allegri has water elements in use.

5.1.2 Noise measurements

The analysis of the acoustic indicators (Table 2) has shown that the A-weighted sound equivalent levels ranged from 63 to about 79 dB(A) for almost all external paths. Inside the sites, the acoustic measurements have revealed that in 6 of the 7 cases, the A-weighted sound equivalent levels were lower than 57 dB(A), being lower than 39 dB(A) in the Cloister of the church of S. Maria Maddalena de' Pazzi.

Observing the differences between the sound levels (Table 2) in terms of LAeq inside and outside, it can be observed that for 6 sites the difference resulted greater than 10 dB. In 4 sites they were even higher than 15 dB and in 2 sites were higher than 20 dB. Only for the site "Piazza del Limbo" the differences resulted of about 9 dB.

Moreover, the differences in the 90th percentiles sound levels show that one of the sites provides up to 17,5 dB (Cloister of the church of S. Maria Maddalena de' Pazzi) sound reduction with respect to the approaching paths.

Lowest differences have been observed in the Courtyard of Palazzo Strozzi, with the background noise (L_{90}) inside higher than along the external path B. This is because inside the courtyard a temporary exhibition was ongoing.

Absolute values show that for these areas the A-weighted sound equivalent levels are in the range 38,5-66,4 dB(A), for the most part, higher than those suggested in the criteria for the potential selection for Urban Quiet Areas [50] of 45–55 dB(A).

Analysis of the subjective survey

Descriptive analysis

The interviewed sample comprises mainly residents and local visitors, and few tourists.

Concerning the age of the sample, it is somewhat evenly distributed among the different age groups: 18% (18-24

Table 2: Acoustic indicators outside/inside the 7 sites under investigation and related differences, in dB(A)

Site	CPS	PPG	PL	CCMM	PC	GG	GBA
LAeq	78,7/66,4	71,1/57,3	64,8/56,1	63,3/38,5	69,4/53,3	69,4/49,0	68,8/49,2
LA10	73,3/68,2	73,6/60,1	67,6/58,4	65,0/41,0	73,0/55,5	73,0/51,5	72,9/51,7
LA90	60,2/64,2	64,9/52,9	58,4/48,2	51,7/34,2	60,9/47,3	60,9/45,3	55,5/43,3
ΔLAeq	12,3	13,8	8,7	24,8	16,1	20,4	19,6
ΔLA10	5,1	13,5	9,2	24	17,5	21,5	21,2
ΔLA90	−4	12	10,2	17,5	13,6	15,6	12,2

Table 3: Answers to question related to the motivation to attend the study areas

Question n.10 - Why would you enter this place?	% of received answers
Because I want to visit it	20,2%
Because I'm looking for a more private place	11,8%
Because I'm looking for areas of shade	10,1%
Because I consider this place a quite area	19,3%
Because I'm looking for green areas	9,2%
Because I'm attracted by the historical and cultural aspects of this place	16,0%
Because it was suggested to me by friends/acquaintances/others	13,4%

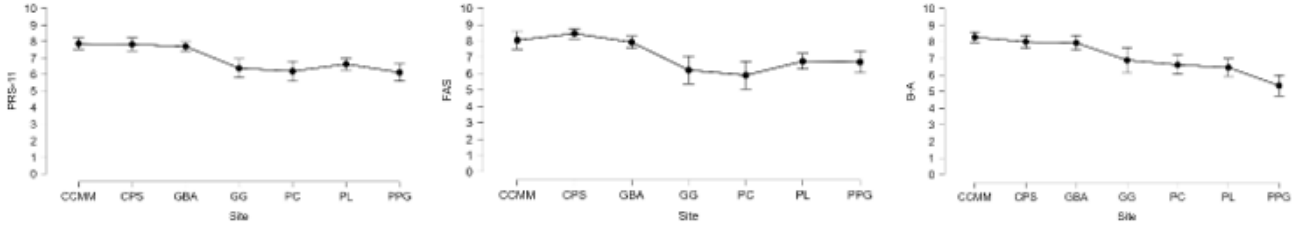

Figure 4: Marginal means of the scores of sites. PRS-11 (left), Fascination (middle) and Being-away (right) Whiskers indicate the standard error

years), 21% (25-39 years), 32% (40-60 years), 29% (> 60 years). Regarding gender, 41 males and 76 females participated to the survey, while 1 participant didn't answer and 1 participant declared to be non binary.

Regarding the residence area, it mainly corresponds to the historical center (44%), followed by the suburban area (23%), the rural and the intermediate area (14% each). People who agreed to complete the subjective survey were mainly employees (32%), followed by retired people (25%), students (20%) and self-employed people (15%). Most of the subjects work in an indoor environment that does not involve physical effort (20%), followed by those who work that takes place both inside and outside (18,5%) and who does an office work (18%).

Concerning the frequency of the visits to the sites, for the most part it was the first time they enter the site (32,7%), followed by a significant number of people who visits them daily (22,7%).

The analysis of data collected through the Subjective Questionnaire shows that some citizens already use the places selected for this study as refuge from the city noise (Table 3). Indeed, 19,3% of those interviewed enter in the selected sites because they are looking for quite areas. Moreover, 20,2% of the respondents stated that they enter the place because they want to visit it. Similarly, 16% is attracted by the historical and cultural features of the place. Other respondents stated that they entered the specific site since it was suggested by other people (13,4%), or since they look for a more private place (11,8%), green areas (9,2%) or shaded areas (10,1%).

The Perceived Restorativeness Scale version at 11 items (PRS-11) of Pasini *et al.* [29] was used to measure the perceived restorativeness of sites through its components: Fascination (FAS), Being Away (B-A), Coherence (COH) and Scope (SCO). The PRS-11 is based on a 11-points Likert scale ranging from 0 to 10. The results, averaged among the interviewed for each site, show (see Figure 4) that almost all the sites were evaluated restorative places (score greater than 6). To analyse the main effect of the sites on the PRS-11, FAS, B-A, COH and SCO scores, five one-way ANOVA were carried out. The results (Figure 4) show that the seven sites resulted significantly different among them in terms of PRS-11 ($F(6,90)=3{,}140$, $p<0{,}01$, $\eta^2=0{,}173$) and their components FAS ($F(6,90)=2{,}808$, $p=0{,}015$, $\eta^2=0{,}158$) and B-A ($F(6,90)=3{,}994$, $p<0{,}001$, $\eta^2=0{,}210$) while not for COH and SCO.

Marginal means show that Courtyard of Palazzo Strozzi received the highest scores in almost all the components of the PRS-11. In particular, the highest value was obtained by the Courtyard of Palazzo Strozzi for the component Fascination ($M_{FAS,CPS}=8{,}5$) which resulted significantly different from Piazza dei Ciompi ($M_{FAS,PC}=5{,}9$) according to the post hoc analysis with Bonferroni correction ($p = 0{,}044$). The Cloister of S. Maria Maddalena dei Pazzi and *Giardino di Borgo Allegri* received comparable high scores, respectively ($M_{FAS,CCMM}=8{,}1$) and ($M_{FAS,GBA}=7{,}9$).

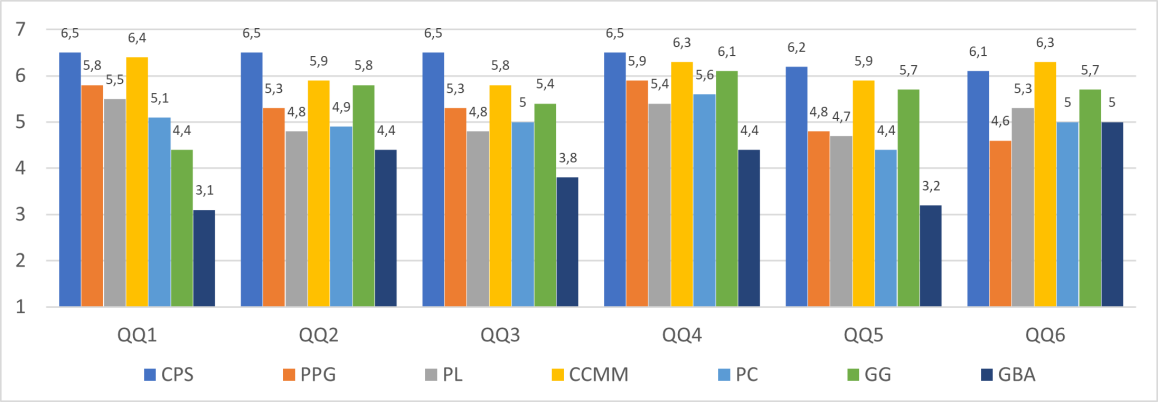

Figure 5: Mean scores of sites per each of the six items of the QA

Similarly, the highest Being-Away scores were obtained by the Cloister of S. Maria Maddalena dei Pazzi ($M_{B-A,CMM}$=8,3), the Courtyard of Palazzo Strozzi ($M_{B-A,CPS}$=8,0) and the *Giardino di Borgo Allegri* ($M_{B-A,GBA}$=7,9) which were perceived to provide a strong fascination in the visitors as well as a high sense of being away from the stress of everyday life and apart from one's usual thoughts and concerns. According to the post hoc analysis with Bonferroni correction, the site of *Palagio di Parte Guelfa (PPG)* ($M_{B-A,PPG}$=5,4) resulted significantly different from them.

The analyses of the Qualitative Aspects Questionnaire show the visitors perception of the presence of cultural elements in the sites.QA1 refer to architectural aspects; QA2 to the cultural value of the site; QA3 to the importance of learning about the history of the location; QA4 to the historical-artistic elements induced curiosity; QA5 to the perceived sense of being away, and QA6 to the distinction with the external environment. As showed in Figure 5, while the Courtyard of Palazzo Strozzi and the Cloister of S. Maria Maddalena dei Pazzi received the highest valuation for all the qualitative features, the historical and architectural aspects (QA1), and the cultural value (QA2) were also considered relevant aspects, respectively, for the square of Palagio di Parte Guelfa and the Giardino del Gratta. Both places also received high valuations regarding the importance of learning about the history of the location to improve perceived well-being (QA3). According to respondents, the Giardino del Gratta gives among the highest feeling of being away from everyday life (QA5) whilst the *Giardino di Borgo Allegri* received the lowest valuations for almost all the items.

The Semantic Differential Scale was used to describe the following five main perceptual dimensions on a 7-point Likert scale (from −3 to +3): Activities, Importance/Relevance, Maintenance/Management, Appreciation and Soundscape. According to the previous research [40, 51], a further Principal Component Analysis (PCA) on the 17 pairs of dichotomic adjectives was carried out to verify the reliability of the following Macro-Aspects structure: Activities (Vibrant-Boring and Chaotic-Calm), Importance/Relevance (Ordinary-Evocative, Worthless-Important, Monotonous-Interesting), Maintenance/Management (Dirty-Clean, Untidy-Tidy, Not Verdant-Verdant, Dangerous-Safe), Appreciation (Annoying-Pleasant (related to environment), Disappointing-Satisfying, Irritating-Relaxing), Soundscape (Loud-Silent, Annoying-Pleasant (related to sounds), Artificial-Natural sounds). With respect to the previous work, a new item Ugly-Beauty has been included. It is expected that it will belong to the Appreciation component.

The result of the sphericity Bartlett's test, χ^2=619 (gdl=136, p< 0.001), allows to refuse the null hypothesis of orthogonality of the variables while those of Kaiser–Meyer–Olkin (KMO) test, KMO index=0.722 to verify an average level of adequacy of sample. In line with the previous PCA analysis, only the first five components were extracted using the Varimax rotation method and a minimum factorial saturation value of 0.5.

Results (Table 4) show that, despite the less load of the five main components (Macro-Aspects), which were able to explain only 53.3% of the total variance, it was also observed that some of the items were associated with a different component. For instance, the item *Monotonous-Interesting* was associated with the "Appreciation" component rather than "Importance-Relevance"; the *Chaotic-Calm* was interpreted by the interviewers as more likely a sense of the order of things and belonged to the "Maintenance-Management" component. Regarding the acoustic items, only the *Artificial-Natural Sound* item was found to describe 6.6% of the total variance, while the *Annoying-Pleasant Sound* was associated with Appreciation of the site. *Loud-Silent* results not sufficiently re-

Table 4: Rotated component matrix of the Principal Component model

	Maintenance-Management	Appreciation	Activity	Importance-Relevance	Soundscape
Irritating-Relaxing	0,779				
Dangerous-Safe	0,738				
Chaotic-Calm	0,726				
Untidy-Tidy	0,629				
Disappointing-Satisficing		0,714			
Annoying-Pleasant Env		0,662			
Monotonous-Interesting		0,646			
Ugly-Beauty		0,608			
Annoying-Pleasant Sound		0,473			
Vibrant-Boring			0,764		
Eventful-Uneventful			0,660		
Ordinary-Evocative				0,801	
Worthless-Important				0,578	
Artificial-Natural Sound					0,457
Not Verdant-Verdant					
Dirty-Clean					
Loud-Silent					

Table 5: Semantic Differential Scale Results

	CPS	PPG	PL	CCMM	PC	GG	GBA
Activities	−1,1	−0,4	0,3	1,1	−0,3	0,3	−0,5
Importance/Relevance	2,5	2,2	1,5	2,2	1,0	0,6	1,4
Mainteinance/Management	2,1	1,3	1,8	2,7	1,8	1,2	2,1
Appreciation	1,2	0,9	1,0	1,1	0,9	0,7	1,1
Soundscape	−0,7	−0,2	−0,6	0,6	0,6	0,9	0,6

lated to any of the 5 components. In the end, most of the total variance was explained by Appreciation (13.7%) and Maintenance/Management (16.3%), while the remaining by Importance/Relevance (8.1%) and Activities (8.5%).

The average results of each of the Macro-Aspects for each of the cloisters are shown in Table 5.

Results show that the Courtyard of Palazzo Strozzi (2.5), the Cloister of the church of S. Maria Maddalena de' Pazzi (2.2) and the Palagio di Parte Guelfa (2.2) received the highest score concerning Importance/Relevance criterion. Moreover, the Cloister of the church of S. Maria Maddalena de' Pazzi is also the most positively rated (1.1) for the Activities. Although all the widenings investigated require more attention regarding the state of maintenance, the site which received the lowest evaluation by the participants is Giardino del Gratta. The Courtyard of Palazzo Strozzi received also the most negative rating, both for the Activities (−1.1) and Soundscape (−0,7).

Statistical analyses

Results of the Pearson correlation matrices (Figure 6, Figure 7, Figure 8) involving the investigated variables show that the Restorativeness of the interviewed was strongly related with the dimension of the Importance and relevance (IMP-REL) of the site, as well as of their general appreciation (APPREC) and the level of maintenance and of order (MAIN—MAN). On the other hands, the level of the activities (ACT) significantly affects the sense of fascination of the site.

The cultural (QA2) and historic (QA3) value, as well as the curiosity induced by the presence of historical-artistic elements (QA4) and the sense of being away (QA5) were also positively and highly correlated with all the dimensions of the restorativeness.

Observing the acoustics descriptors, the ones that mainly affect the Restorativeness are the 90^{th} percentile of the A-weighted sound equivalent levels outside the cloister. That is, the sound levels of the areas where the subjects

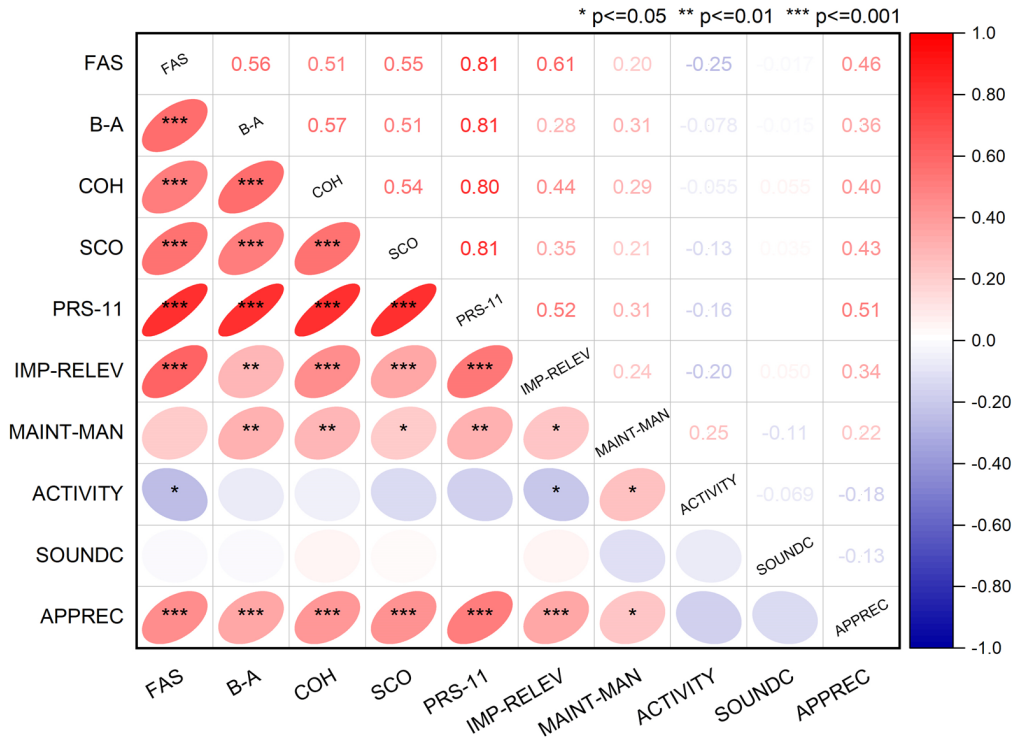

Figure 6: Pearson correlation matrix between the five macro-aspects, Perceived Restorativeness Scale (PRS-11) and its components: Fascination (FAS); Being-Away (B-A); Coherence (COH) and Scope (SCO)

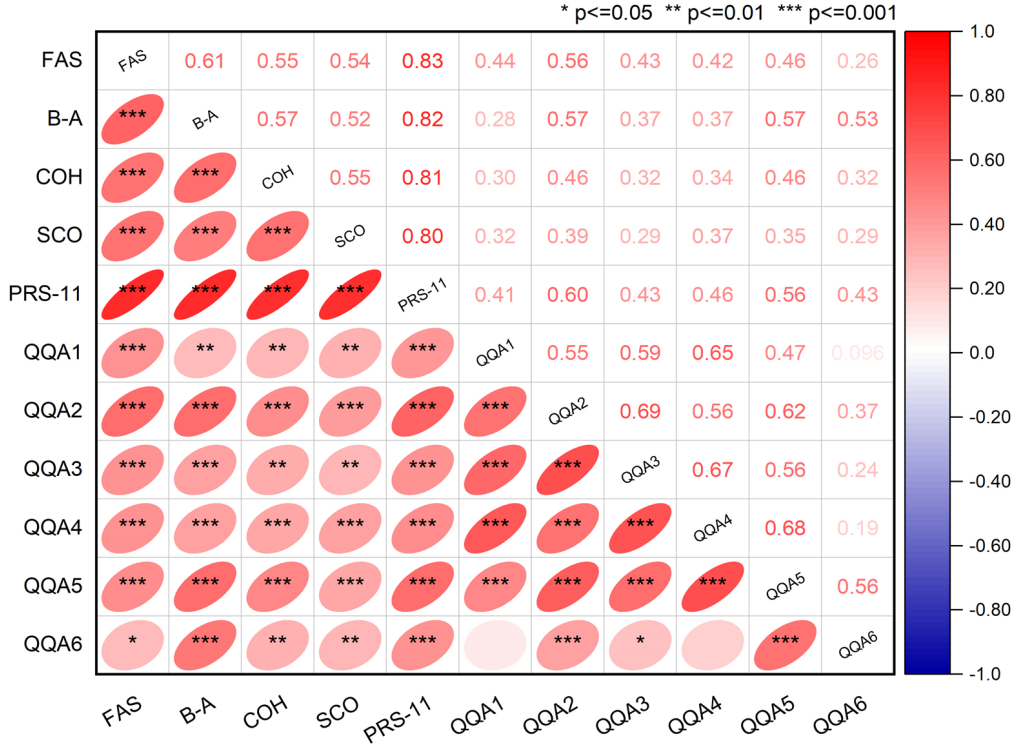

Figure 7: Pearson correlation matrix of the Perceived Restorativeness Scale (PRS-11), its components: Fascination (FAS); Being-Away (B-A); Coherence (COH) and Scope (SCO) and the Qualitative Aspects (QA)

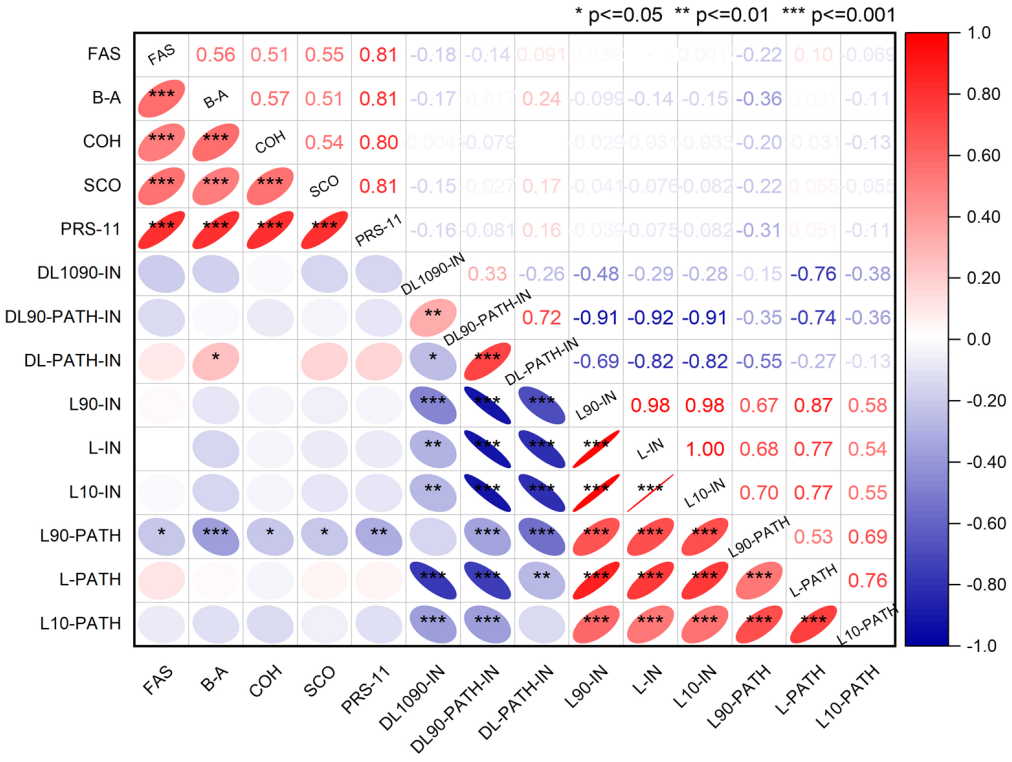

Figure 8: Pearson correlation matrices between the Perceived Restorativeness Scale (PRS-11) and its components: Fascination (FAS); Being-Away (B-A); Coherence (COH) and Scope (SCO), and the Sound Pressure levels inside and outside the sites

came from has a significative negative effect on the sense of Being-Away of the individuals. This is still evident observing the positive effect due to the increasing of the differences in the 90th percentile between outside and inside measurements.

6 Discussion

During the carried-out research, the survey was conducted using in situ acoustic measurements, questionnaires and binaural sound recordings at outdoor historical sites inside the city of Florence. The survey investigated the potential of those places (*e.g.*, courtyards, squares, urban gardens, cloisters) hidden inside the urban fabric of the historical center of the cities.

By observing the acoustic characteristics of the sites and comparing it with that of the respective surroundings, it emerged that these sites provide significant reductions in the A-weighted sound equivalent levels, ranging from 9 to about 25 dB(A). For almost three-quarters of the sites, 90th percentile A-weighted sound levels were lower than 53 dB(A).

Concerning the perceptive survey, it appears significant that the highest rating for importance and relevance is associated with the Cloister of the church of S. Maria Maddalena de' Pazzi that also has the greatest difference (of approximately 25 dB(A) between the noise levels measured immediately outside and inside). Moreover, with reference to the cultural and historical aspects, the Courtyard of Palazzo Strozzi and the cloister of S. Maria Maddalena dei Pazzi received the highest scores to the questions dealing with architectural aspects, cultural value of the site, the importance of learning about the history of the location, the historical-artistic elements inducing curiosity, the perceived sense of being away and the distinction with the external environment. The Borgo Allegri Garden and the cloister of S. Maria Maddalena dei Pazzi received the second highest valuation as regards the Being Away component, being perceived as places providing the visitors with a strong sense of being away from the stress of everyday life and apart from one's usual thoughts and concerns.

In accordance with the principal component analysis and Pearson correlation matrices, the importance of the historical and cultural aspects of the investigated locations in relation to the restorativeness characteristic emerged and was confirmed.

Furthermore, the importance of having places that offer an escape and a break from the surrounding places is emphasized by the respondents.

7 Conclusions

Florence, a UNESCO World Heritage Site since 1982, offers numerous outdoor historical sites, which are often hidden and scattered through the principal historical places and buildings. To take advantage of these spaces, providing, maintaining and reveal outdoor spaces where residents and tourists can escape from the noise and chaos of cities to relax or perform activities is one of the main scopes of the methodology developed by the Università degli Studi della Campania. Quiet areas, defined by the EC as areas free of unwanted sound where people can have a restorative experience and relief from the stress of city life, are commonly associated with large green parks which, however, are usually located outside or far from city centers. The method focuses on finding alternative quiet spaces that residents and tourists could use for restorative purposes, such as old cloisters and courtyards of historical buildings [33]. These spaces, as well as offering an opportunity to refresh and rest from the surrounding noise, have the added value of providing cultural and cognitive cues for tourists, who are often "distracted" by "classic" routes and victims of "hit and run" tourism, but also for the residents themselves, who are often unaware of these peculiarities of the places where they live.

The methodology was applied to several examples displaced within the tourist historical city center of Florence and, beside among these sites significantly differences resulted in terms of restorativeness, all of them could be accepted as pocket of quite and received appreciation by the respondents with particular emphasis to the historical and cultural aspects and to the variation of the sound level approaching the site.

The result of the study is satisfactory in terms applicability and repeatability of the methodology.

A possible future development of this research is however a deeper comparison between the results obtained for the city of Florence with those already analyzed for the cities of Naples, Istanbul and Murcia.

Lastly, a more ambitious project to be carried out still in collaboration with the Municipality of Florence, concerns the possibility of constructing a real digital map of the city's refreshment areas, also useful for planning alternative tourist routes or to help locals discover places that are unknown to some. This would contribute to provide citizens, tourists and visitors with historical and cultural information, noise levels and audio recordings inside and outside.

Funding information: The authors state no funding involved.

Author contributions: All authors have accepted responsibility for the entire content of this manuscript and approved its submission.

Conflict of interest: The authors state no conflict of interest.

References

[1] Basner M, Babisch W, Davis A, Brink M, Clark C, Janssen S, et al. Auditory and non-auditory effects of noise on health. The Lancet. 2014 Apr;383(9925):1325–32.
[2] European Environment Agency. Environmental noise in Europe. 2020. Report No.: EAA Report n.22/2019.
[3] EAA. Good practice guide on noise exposure and potential health effects. Tech Rep No 112010. 2010;
[4] Chiesura A. The role of urban parks for the sustainable city. Landsc Urban Plan. 2004 May;68(1):129–38.
[5] Radicchi A. Beyond the Noise: Open Source Soundscapes. A mixed methodology to analyze and plan small, quiet areas on the local scale, applying the soundscape approach, the citizen science paradigm, and open source technology. J Acoust Soc Am. 2017 May;141(5):3622–3622.
[6] Watts G, Miah A, Pheasant R. Tranquillity and Soundscapes in Urban Green Spaces—Predicted and Actual Assessments from a Questionnaire Survey. Environ Plan B Plan Des. 2013 Feb;40(1):170–81.
[7] Cerwén G, Mossberg F. Implementation of Quiet Areas in Sweden. Int J Environ Res Public Health. 2019 Jan 7;16(1):134.
[8] Bartalucci C, Borchi F, Carfagni M, Governi L, Luzzi S, Aspuru I, et al. LIFE+2010 QUADMAP Project: results obtained from the analysis of data collected during the application of the new methodology to the pilot quiet areas. Noise Mapp. 2019 Jan 1;6(1):22–37.
[9] Radicchi A, Henckel D, Memmel M. Citizens as smart, active sensors for a quiet and just city. The case of the "open source soundscapes" approach to identify, assess and plan "everyday quiet areas" in cities. Noise Mapp. 2018 Apr 3;5(1):1–20.
[10] Brambilla G, Maffei L. Responses to noise in urban parks and in rural quiet areas. Acta Acust United Acust. 2006;92(6):881–6.
[11] Delaitre P, Lavandier C, Dedieur R, Gey N. Meaning of quiet areas in urban context through people viewpoints. Acoustics. 2012 Apr; Nantes, France. Société Française d'Acoustique, 2012.
[12] Brambilla G, Gallo V, Asdrubali F, D'Alessandro F. The perceived quality of soundscape in three urban parks in Rome. J Acoust Soc Am. 2013 Jul;134(1):832–9.
[13] Booi H, van den Berg F. Quiet Areas and the Need for Quietness in Amsterdam. Int J Environ Res Public Health. 2012 Mar 23;9(4):1030–50.
[14] Lavandier C, Delaitre P. Individual and shared representations on "zones calmes" ("quiet areas") among the French population in urban context. Appl Acoust. 2015 Dec;99:135–44.
[15] Kang J. Acoustics and Sustainability: A Built Environment Perspective. Int J Acoust Vib. 2020 Sep 30;25(3):292–292.

[16] Tsaligopoulos A, Kyvelou S, Votsi NE, Karapostoli A, Economou C, Matsinos Y. Towards a new understanding of the concept of quietness. J Acoust Soc Am. 2021 Apr;149(4):A72–A72.
[17] Schäffer B, Brink M, Schlatter F, Vienneau D, Wunderli JM. Residential green is associated with reduced annoyance to road traffic and railway noise but increased annoyance to aircraft noise exposure. Environ Int. 2020 Oct;143:105885.
[18] Parliament E. Directive 2002/49/EC of the European Parliament and of the Council of 25 June 2002 relating to the assessment and management of environmental noise. 2002.
[19] European Environment Agency. Good practice guide on quiet areas. Report No.: EEA Technical report n.4. 2014.
[20] Ministero della Transizione Ecologica. Definizione delle modalità per l'individuazione e la gestione delle zone silenziose di un agglomerato e delle zone silenziose in aperta campagna. 16 Mar 24, 2022.
[21] Bornioli A, Subiza-Pérez M. Restorative urban environments for healthy cities: a theoretical model for the study of restorative experiences in urban built settings. Landsc Res. 2022 Sep 21;1–12.
[22] Subiza-Pérez M, Vozmediano L, San Juan C. Welcome to your plaza: Assessing the restorative potential of urban squares through survey and objective evaluation methods. Cities. 2020 May;100:102461.
[23] Zhang X, Ba M, Kang J, Meng Q. Effect of soundscape dimensions on acoustic comfort in urban open public spaces. Appl Acoust. 2018 Apr;133:73–81.
[24] Luo S, Shi J, Lu T, Furuya K. Sit down and rest: Use of virtual reality to evaluate preferences and mental restoration in urban park pavilions. Landsc Urban Plan. 2022 Apr;220:104336.
[25] Kang Y, Kim EJ. Differences of Restorative Effects While Viewing Urban Landscapes and Green Landscapes. Sustainability. 2019 Apr 10;11(7):2129.
[26] Kaplan S. The restorative benefits of nature: Toward an integrative framework. J Environ Psychol. 1995 Sep;15(3):169–82.
[27] Hartig T, Korpela K, Evans GW, Gärling T. A measure of restorative quality in environments. Scand Hous Plan Res. 1997 Jan;14(4):175–94.
[28] Laumann K, Gärling T, Stormark KM. Rating scale measures of restorative components of environments. J Environ Psychol. 2001 Mar;21(1):31–44.
[29] Pasini M, Berto R, Brondino M, Hall R, Ortner C. How to Measure the Restorative Quality of Environments: The PRS-11. Procedia - Soc Behav Sci. 2014 Dec;159:293–7.
[30] Jeon JY, Lee PJ, You J, Kang J. Perceptual assessment of quality of urban soundscapes with combined noise sources and water sounds. J Acoust Soc Am. 2010 Mar;127(3):1357–66.
[31] Ratcliffe E, Gatersleben B, Sowden PT. Bird sounds and their contributions to perceived attention restoration and stress recovery. J Environ Psychol. 2013 Dec;36:221–8.
[32] Ratcliffe E, Gatersleben B, Sowden PT. Predicting the Perceived Restorative Potential of Bird Sounds Through Acoustics and Aesthetics. Environ Behav. 2020 May;52(4):371–400.
[33] Coensel BD, Vanwetswinkel S, Botteldooren D. Effects of natural sounds on the perception of road traffic noise. J Acoust Soc Am. 2011 Apr;129(4):EL148–53.
[34] Jiang B, Chang CY, Sullivan WC. A dose of nature: Tree cover, stress reduction, and gender differences. Landsc Urban Plan. 2014 Dec;132:26–36.
[35] Nordh H, Hartig T, Hagerhall CM, Fry G. Components of small urban parks that predict the possibility for restoration. Urban For Urban Green. 2009 Jan;8(4):225–35.
[36] Masullo M, Maffei L, Pascale A, Senese VP, De Stefano S, Chau CK. Effects of Evocative Audio-Visual Installations on the Restorativeness in Urban Parks. Sustainability. 2021 Jul 26;13(15):8328.
[37] Guo X, Liu J, Albert C, Hong XC. Audio-visual interaction and visitor characteristics affect perceived soundscape restorativeness: Case study in five parks in China. Urban For Urban Green. 2022 Nov;77:127738.
[38] Hidalgo, M. Carmen, Berto, Rita, Galindo, Maria Paz, Getrevi, Anna. Identifying attractive and unattractive urban places: categories, restorativeness and aesthetic attributes. Medio Ambiente y Comportamiento Humano. 2006;7(2):115–33.
[39] Scopelliti M, Carrus G, Bonaiuto M. Is it Really Nature That Restores People? A Comparison With Historical Sites With High Restorative Potential. Front Psychol. 2019 Jan 28;9:2742.
[40] Masullo M, Ozcevik Bilen A, Toma RA, Akin Guler G, Maffei L. The Restorativeness of Outdoor Historical Sites in Urban Areas: Physical and Perceptual Correlations. Sustainability. 2021 May 17;13(10):5603.
[41] Chiesi L, Costa P. Small Green Spaces in Dense Cities: An Exploratory Study of Perception and Use in Florence, Italy. Sustainability. 2022 Mar 30;14(7):4105.
[42] Masullo M, Castanò F, Toma RA, Maffei L. Historical Cloisters and Courtyards as Quiet Areas. Sustainability. 2020 Apr 4;12(7):2887.
[43] Masullo M, Toma RA, Maffei L. Further investigation on pockets of quiet within historical city centres: the case of widenings. INTER-NOISE NOISE-CON Congress and Conference Proceedings. 2021 Aug 1-5; Virtual. 2021 Aug 1;263(3):3056–63.
[44] Maffei L, Masullo M, Oliviero A. Quiet areas inside historical city centers. INTER-NOISE 2017; 2017 Aug 27-30; Hong Kong, China. INTER-NOISE, 2017.
[45] Weber AM, Trojan J. The Restorative Value of the Urban Environment: A Systematic Review of the Existing Literature. Environ Health Insights. 2018 Jan;12:117863021881280.
[46] Masullo M, Toma RA, Navarro Ruiz JM, Hernandez Bellot J, Maffei L. The effects of different sound environments on physiological stress recovery and perceived Restorativeness. INTER-NOISE 2022; 2022 Aug 21-24; Glasgow, Scotland. INTER-NOISE, 2022.
[47] Khomenko S, Cirach M, Pereira-Barboza E, Mueller N, Barrera-Gómez J, Rojas-Rueda D, et al. Premature mortality due to air pollution in European cities: a health impact assessment. Lancet Planet Health. 2021 Mar;5(3):e121–34.
[48] Senese VP, Ruotolo F, Ruggiero G, Iachini T. The Italian Version of the Weinstein Noise Sensitivity Scale: Measurement Invariance Across Age, Sex, and Context. Eur J Psychol Assess. 2012 Nov 1;28(2):118–24.
[49] Hülsmeier D, Schell-Majoor L, Rennies J, Van de Par S. Perception of sound quality of product sounds. A subjective study using a semantic differential. INTER-NOISE 2014; 2014 Nov 14-19; Melbourne, Australia. INTER-NOISE, 2014.
[50] Agency EE. Noise in Europe 2014. ISSN 1977-8449. 2014;
[51] Axelsson Ö, Nilsson ME, Berglund B. A principal components model of soundscape perception. J Acoust Soc Am. 2010 Nov;128(5):2836–46.

Annex I – Questionnaire's template (English version)

QUESTIONNAIRE ON THE PERCEPTION OF URBAN ENVIRONMENT

We kindly ask you to fill in the following questionnaire which is composed by 4 parts. The main goal of the questionnaire is to collect data on people perceptions of this place.

The survey is carried out by Università degli Studi della Campania Luigi Vanvitelli (*Vanvitelli University*).

Your personal data will be treated as strictly confidential and the publication of the survey results will ensure the non-recognition of the responses.

PART – SUBJECTIVE QUESTIONNAIRE

GENERAL INFORMATIONS–PART 1

Age	(tick with x)
Between 18 and 24	
Between 25 and 39	
Between 40 and 60	
More than 60	

Sex	(tick with x)
Male	
Female	
Non-Binary	

Residential area	(tick with x)
historical center	
intermediate area	
suburban	
rural area	

Employment	(tick with x)
Student	
Housewife	
Pensioner	
Employee	
Self employed	
unemployed	

Type of work	(tick with x)
Office work	
Work in an indoor environment that does not involve physical effort	
Work in an indoor environment that involves physical effort	
Outdoor work that does not involve physical effort	
Outdoor work that involves physical effort	
Work that takes place both inside and outside	

Provenance	(tick with x)
Tourist	
Local (I live in this area)	
Local (I do not live in this area)	
Inhabitant of a neighboring municipality (same province)	

If you live in this area, at which distance?	(tick with x)
Less than 300 metres	
Between 300 and 500 metres	
Between 500 metres and 1 kilometre	
Between 1 and 3 kilometres	

How often do you come to this place?	(tick with x)
Daily	
Weekly	
Monthly	
Only in spring / summer	
Several times a year	
I have never visited this place	

How much time do you spend on average in this place?	(tick with x)
Between 0 and 5 minutes	
Between 5 and 10 minutes	
Between 10 and 20 minutes	
Between 20 and 30 minutes	
Between 30 and 60 minutes	
More than 60 minutes	

Why would you enter this place?	(put the following statements in order of preference)
Because I want to visit it	
Because I'm looking for a more private place	
Because I'm looking for areas of shade	
Because I consider this place a quite area	
Because I'm looking for green areas	
Because I'm attracted by the historical and cultural aspects of this place	
Because it was suggested to me by friends/acquaintances/others	

How long would you be willing to walk to reach this place?	(put the following statements in order of preference)
Between 0 and 5 minutes	
Between 5 and 10 minutes	
Between 10 and 20 minutes	
Between 20 and 30 minutes	
Between 30 and 60 minutes	
More than 60 minutes	

4 PART – SUBJECTIVE QUESTIONNAIRE

WEINSTEIN NOISE SENSITIVITY SCALE (WNSS) – PART 2

Select for each statement below, the number (1 to 6) based on how much the statement describes your attitude towards noise Please note, "1" = "strongly disagree/not at all" and "6" = "strongly agree/very much"						
1. I wouldn't mind living on a noisy street if the apartment I had was nice	1	2	3	4	5	6
2. I am more aware of noise than I used to be	1	2	3	4	5	6
3. No one should mind much if someone turns up his stereo full blast once in a while	1	2	3	4	5	6
4. At movies, whispering and crinkling candy wrappers disturb me	1	2	3	4	5	6
5. I am easily awakened by noise	1	2	3	4	5	6
6. If it's noisy where I'm studying, I try to close the door or window or move somewhere else	1	2	3	4	5	6
7. I get annoyed when my neighbors are noisy	1	2	3	4	5	6
8. I get used to most noises without much difficulty	1	2	3	4	5	6
9. How much would it matter to you if an apartment you were interested in renting was located across from a fire station?	1	2	3	4	5	6
10. Sometimes noises get on my nerves and get me irritated	1	2	3	4	5	6
11. Even music I normally like will bother me if I am trying to concentrate	1	2	3	4	5	6
12. It wouldn't bother me to hear the sounds of everyday living from neighbors (footsteps, running water, etc.)	1	2	3	4	5	6
13. When I want to be alone, it disturbs me to hear outside noises	1	2	3	4	5	6
14. I am good at concentrating no matter what is going on around me	1	2	3	4	5	6
15. In a library, I don't mind if people carry on a conversation if they do it quietly	1	2	3	4	5	6
16. There are often times when I want complete silence	1	2	3	4	5	6
17. Motorcycles ought to be required to have bigger mufflers	1	2	3	4	5	6
18. I find it hard to relax in a place that's noisy	1	2	3	4	5	6
19. I get mad at people who make noise that keeps me from falling asleep or getting work done	1	2	3	4	5	6
20. I wouldn't mind living in an apartment with thin walls	1	2	3	4	5	6
21. I am sensitive to noise.	1	2	3	4	5	6

4 PART – SUBJECTIVE QUESTIONNAIRE

PERCEIVED RESTORATIVENESS SCALE (PRS11) – PART 3

Instructions

The following questionnaire is used to evaluate your experience in places like this.

Please read every sentence carefully and then evaluate on a scale from 0 to 10 as each statement corresponds to your experience in this place.

To choose your answer mark only one of the numbers on the scale next to each statement with a cross. Below you can find an example of the scale:

(not at all) 0 — 1 — 2 — 3 — 4 — 5 — 6 — 7 — 8 — 9 — 10 (very much)

For example, if you think that the sentence does not correspond at all to your experience in this place mark "0" (not at all), if you think that the sentence matches enough but not completely to your experience, then mark a number from "1 "to" 9 "that reflects what you think about your experience in this place, but if you think that the sentence corresponds very much to your experience in in this place, then mark" 10 " (very much).

1. Places like that are fascinating	Not at all	0	1	2	3	4	5	6	7	8	9	10	Very much
2. In places like this my attention is drawn to many interesting things	Not at all	0	1	2	3	4	5	6	7	8	9	10	Very much
3. In places like this it is hard to be bored	Not at all	0	1	2	3	4	5	6	7	8	9	10	Very much
4. Places like that are a refuge from nuisances	Not at all	0	1	2	3	4	5	6	7	8	9	10	Very much
5. To get away from things that usually demand my attention I like to go to places like this	Not at all	0	1	2	3	4	5	6	7	8	9	10	Very much
6. To stop thinking about the things that I must get done I like to go to places like this	Not at all	0	1	2	3	4	5	6	7	8	9	10	Very much
7. There is a clear order in the physical arrangement of places like this.	Not at all	0	1	2	3	4	5	6	7	8	9	10	Very much
8. In places like this it is easy to see how things are organized.	Not at all	0	1	2	3	4	5	6	7	8	9	10	Very much
9. In places like this everything seems to have its proper place.	Not at all	0	1	2	3	4	5	6	7	8	9	10	Very much
10. That place is large enough to allow exploration in many directions	Not at all	0	1	2	3	4	5	6	7	8	9	10	Very much
11. In places like that there are few boundaries to limit my possibility for moving about.	Not at all	0	1	2	3	4	5	6	7	8	9	10	Very much

4 PART – SUBJECTIVE QUESTIONNAIRE

QUALITATIVE ASPECTS QUESTIONNAIRE (QA) - PART 4.1

Select for each statement below, the number (1 to 7) based on how much the statement describes your perception places Please note, "1" = "not at all" and “7” = “very much”							
1. In places like this the historical – architectural aspects capture my attention	1	2	3	4	5	6	7
2. The presence of elements of cultural value help me to distract myself from the stress of everyday life	1	2	3	4	5	6	7
3. The information on the artworks of the place, if present, increase my well-being	1	2	3	4	5	6	7
4. Historical urban areas like these affect my curiosity	1	2	3	4	5	6	7
5. The historical – cultural dimension of places like this makes me want to lose myself in another world	1	2	3	4	5	6	7
6. The type of entry creates a clear distinction with the external environment	1	2	3	4	5	6	7

4 PART – SUBJECTIVE QUESTIONNAIRE

SEMANTIC DIFFERENTIAL SCALE - PART 4.2

Below is a form containing a series of pairs of bipolar adjectives. Thinking about the place where you are, tick with a cross the position more or less close to the adjective you think is more appropriate to describe your impression of this place and of its soundscape. Answer without dwelling too much.

Below you can find an example:

Interesting	X							Monotonous

If you think that the place where you are is *very interesting* mark the box closest to the adjective; if you think that the adjective matches enough but not completely to your impression, then mark a box more distant from the adjective; if you think that the place is not interesting but *Monotonous* mark the box with the position closest to your impression.

Describe your impression of this place								
Interesting								Monotonous
Ordinary								**Evocative**
Worthless								*Important*
Untidy								Tidy
Verdant								**Not Verdant**
Clean								*Dirty*
Dangerous								Safe
Eventful								Uneventful
Irritating								**Relaxing**
Vibrant								*Boring*
Chaotic								Calm
Satisfying								Disappointing
Beautiful								**Ugly**
Pleasant								*Annoying*

Describe your impression of the soundscape of this place								
Natural								Artificial
Loud								**Silent**
Pleasant								*Annoying*