CITIES & HEALTH
2021, VOL. 5, NOS. 1–2, 1–13
https://doi.org/10.1080/23748834.2020.1821980

Routledge
Taylor & Francis Group

LEADING EDITORIAL



# Sound and the healthy city

Antonella Radicchi[a], Pınar Cevikayak Yelmi[b], Andy Chung[c], Pamela Jordan[d], Sharon Stewart[e], Aggelos Tsaligopoulos[f], Lindsay McCunn[g] and Marcus Grant[h]

[a]Institute of City and Regional Planning, Technical University of Berlin, Berlin, Germany; [b]Visual Communication Design Department, Işık University, Istanbul, Turkey; [c]Macau Instituto de Acústica, Macau; [d]Centre for Ancient Studies and Archaeology, University of Amsterdam, Amsterdam, Netherlands; [e]Professorship Theory in the Arts, ArtEZ University of the Arts, Netherlands; [f]Department of Environment, University of the Aegean, Mytilene, Greece; [g]Department of Psychology, Vancouver Island University, Nanaimo, Canada; [h]Environmental Stewardship, Bristol, UK

**ABSTRACT**

At an international level it is recognised that urban noise has serious and negative public health impacts. This leading editorial and the special issue it accompanies seeks to broaden this agenda. An important goal for Cities & Health is to give ear to new urban health topics, methods and collaborations. In doing so this paper presents the topic of urban sound and health from several unique angles. At its core, we deliberately move the focus beyond noise levels, as measured by decibels, and harm to health through the stress of relentless background noise. Instead, we focus on the concept of soundscape, a more qualitatively nuanced research subject of enquiry. The paper serves as an introduction to soundscape and health from several distinct disciplinary positions and lays a good intellectual foundation for the twenty-two papers published in this special issue. We hope that through a soundscape approach we can encourage fresh thinking about urban sound, including how people perceive and relate to their sonic environments, and show how sound can contribute to health. We believe that this approach can provide a collaborative platform for sound artists, sound technologists, urbanists and local people to work together with public health and create healthier urban environments.

**ARTICLE HISTORY**
Received 31 August 2020
Accepted 1 September 2020

**KEYWORDS**
Healthy cities; urban design and planning; citizen science and citizen-generated data; soundscape; noise and quiet areas; ecology; sound art

## Introduction

During the lockdown imposed by the world changing and tragic COVID-19 pandemic outbreak, we have witnessed people gathering on their balconies, at their windows and by their front doors to collectively send out supportive messages to health-care workers and patients. The medium chosen was sound. In Italy, in the evening, quarantined people sang and clapped their hands from their balconies in an effort to keep up morale as the country faced the worst coronavirus outbreak outside China (The Guardian 2020). In New York, at seven each night, people cheered for front-line workers by clapping their hands and making sounds using everyday life tools like boxes, keys and small bells (The New York Times 2020). These are just two examples, but they highlight how sounds can convey positive emotions and feelings, and how human beings attach values and meanings to sound.

As a contrast, most studies in the field of healthy cities address sound as a negative by-product of the environment, measuring it via quantitative indicators such as decibels (dB) and highlighting its negative effects on health and well-being (WHO 2018). This approach is certainly useful to analyze and map noise pollution, the second most prominent urban environmental stressor affecting people's health in Europe (WHO 2018). Recent studies reported by the EEA (2020) show that at least one in five European people are exposed to levels considered harmful to health, and that an estimated 113 million people are affected by long-term, day-evening-night traffic noise levels of at least 55 dB(A) every year. The WHO (2018) alerts us that long term exposure to noise can cause cardiovascular diseases, cognitive impairment, sleep disturbance, hypertension and annoyance, potentially leading to premature death. The associated decline in the population's health because of noise has an economic impact, too. For example, according to (EEA 2020), in the European Union the economic impact of noise is estimated to be EUR 35 billion for annoyance, EUR 34 billion for sleep disturbance, and EUR 5 million for cognitive impairment in children. Furthermore, monetary costs can also be caused by reduced house prices, loss of labour days and reduced possibilities for land use (EEA 2020).

Despite this alarming data, the European Environment Agency recognizes that the number of people exposed to high levels of noise is not decreasing, and that the 7th Environment Action Program's objective of reducing noise pollution in Europe and moving closer to the WHO recommended levels by 2020 has not been achieved (EEA 2020). Worryingly,

**CONTACT** Antonella Radicchi antonella.radicchi@tu-berlin.de Technical University of Berlin, Berlin, Germany

the Agency estimates that the number of people exposed to high levels of road traffic noise is likely to increase because of future urban growth and an increased demand for mobility (EEA 2020).

Facing such a dramatic scenario, what actions can be taken to effectively meet the WHO recommendations?

Whilst it is imperative to continue implementing noise reduction measures to safeguard health, protect the environment and save costs to society, in this editorial we want to raise awareness that the pursuit of an exclusively anti-noise quantitative approach can be limiting for at least two reasons. First, the application of anti-noise, sound reduction, measures can lead to 'silencing our public environment' (Neuhaus 1974), with the unintended consequence of reducing or even losing positive environmental and human sounds, beneficial to our health and well-being. Indeed, for most people sound is fundamental to our living in the world, complementing our other senses. Sound helps us communicate and orient ourselves in space, and sound moves us emotionally, both consciously and unconsciously. Second, sounds are inherently both objective and subjective in nature (see *inter alia* Kang and Schulte-Fortkamp 2015): the same physical quantum of sound pressure can be perceived as pleasant or as annoying depending on the sound source, for example if the sounds originate from a water fountain or a car, from a friend having a party or a noisy neighbour, or whether sounds are perceived as appropriate to the context or not.

As such, as editors of this special issue, we believe that in addition to quantitative indicators, we must integrate qualitative approaches, such as the *soundscape* one, into the assessment and management of the acoustic environment. This implies accounting for people's perceptual responses to the acoustic environment in accordance with the definition of *soundscape* as an 'acoustic environment as perceived, experienced, and/or understood by people, in context' (ISO 2014). In terms of management, a soundscape-based approach implies creatively and collectively *composing* the acoustic environment through positive sounds to support a healthy place-making agenda. In other words, we believe that in the same way that health cannot be defined as 'merely the absence of disease' (WHO, 1948), the mere absence of noise is not sufficient to ensure an acoustic environmental quality for our physical and mental health, social well-being, and the environment.

But how do we capture and define what we mean by 'acoustic quality'?

Inclusive multiform governance of the acoustic environment may be needed to ensure that needs and desires of different groups and stakeholders are accounted for through open and continuous participatory processes for assessing, planning and managing the acoustic environment. This vision intentionally resonates with the imaginative metaphor of the 'soundscape of the world as a huge musical composition, unfolding around us ceaselessly [where w]e are simultaneously its audience, its performers and its composers.' (Schafer 1977). With health and well-being in mind, let us then conceptualise the acoustic environment as a 'musical composition', as a *collective* piece. Let us pursue a multidisciplinary approach as scholars, as professionals and as activists across the fields of urban design and planning, acoustics, public health, ecology, mobility, psychology, new technology and the arts in pursuit of soundscapes for healthier environments.

In these fields, seeds of change have been disseminated by many pioneers in the past years. Some of this work is referred to below to offer inspirational concepts, policies and practices that, we hope, will help move towards healthier cities.

## Policy-making, plans and soundscape design projects

The 2002 Environmental Noise Directive is the primary European legislative framework for achieving noise reduction and quiet areas protection in open country and agglomerations (EPC 2002). The Directive requires that Member States determine exposure to environmental noise through noise mapping; inform the public on environmental noise and its effects; and adopt noise-reduction action plans based on noise-mapping results. Specifically, the Directive requires that the Member States 'ensure that the public is consulted about proposals for action plans, [...], that the results of that participation are taken into account and that the public is informed on the decisions taken' (EPC 2002). In other words, the Directive draws on an anti-noise quantitative approach to the acoustic environment and on a model of citizen participation, which addresses two levels of 'tokenism': 'Informing' and ' Consultation', 'that allow the have-nots to hear and to have a voice' (Arnstein 1969).

Valuable exceptions to this methodological and policy framework can be found in the form of design projects, noise action plans and policies where the soundscape approach is used as a driver for enabling people's participation in context-based urban design and planning processes, pursuing acoustic environmental quality for health and the environment.

A participatory soundscape approach as a co-design method was applied for the first time in the renovation of Nauener Platz,[1] a square-park located in the Mitte neighbourhood of Berlin. Residents were included in each stage of the project development by means of different engagement measures, such as a party and flea market, a public hearing, soundwalks, workshops and narrative interviews (Schulte-Fortkamp and Jordan 2016). Drawing on people's preferences and shared desires, renovation measures were implemented to

alter the soundscape of this public open space, such as the introduction of bird songs and ocean waves, which local people wished to hear when visiting (Schulte-Fortkamp and Jordan 2016).

The City of London released its Noise Strategy 2016 to 2026 to set the strategic direction for noise and soundscape policy in the financial heartland, the Square Mile – called the City. The strategy recognises that 'the noise resulting from the vibrancy of the City for many is iconic, invigorating and an essential element or "buzz" of the City "soundscape"' (City of London 2016). It also sets out the actions needed to maintain and, where possible, improve the City's soundscape. For example, it recognises the need to provide respite from urban noise and encourages the identification and protection of relatively tranquil areas in the City. It recommends the preservation of 'iconic sounds' such as church bells, which should be possibly enhanced by additional co-ordinated 'bell happenings' to increase awareness of their existence. The Strategy also includes the possibility of adding sounds to the public domain, for example by means of public sound art installations, and it encourages the conduction of public soundwalks and audio walks in the City.

With the release of its Noise and Soundscape Action Plan 2018–2023, the Welsh Government is possibly the first national government in Europe to explicitly refer to the emergent science of soundscape in national policy. The Plan recognises that a healthy acoustic environment is more than simply the absence of unwanted sound, and it stresses the need to collectively create appropriate soundscapes in spatio-temporal context (Welsh Government 2018).

The city of Valencia incorporated in its city's Noise Action Plan 2018–2023 the soundscape approach for the identification of areas of good acoustic quality (Herranz-Pascual *et al.* 2019). Through a two-step methodology, a number of districts were selected for analysis especially focussing on green space. In the second phase, a collaborative evaluation process was opened using the ComfortUP! App, which is an application that allows users to collect their opinions on environmental comfort, including the acoustic environmental quality (Herranz-Pascual *et al.* 2019).

The Municipality of Berlin also experimented with the soundscape approach for the update of its Berlin Plan of Quiet Areas within the context of the public participation campaign "Berlin wird leiser, held for the preparation of the Berlin Noise Action Plan 2019–2023. Two public group soundwalks were organized with stakeholders and citizens in two districts of Berlin (Mitte, Pankstrasse area and Altstadt Köpenick) in order to involve people in mapping and assessing quiet areas (Radicchi 2018a, 2018b). The Berlin Senate promoted the use of Hush City, a free citizen science app, which enables people to identify and assess quiet areas and upload the data to an open access, web-based map (Radicchi 2017a). As of September 2018, over 160 quiet areas were mapped in Berlin using Hush City (Radicchi 2019a), the total now stands at over 300. The new Berlin Plan of Quiet Areas (Berlin Senate 2020) takes into account and reports on this citizen-generated data, collected by people during the soundwalks and with the Hush City app. This data, along with other literature sources, has influenced the introduction of a new concept of urban quiet area, called *städtische Ruhe- und Erholungsräume (urban rest and relaxation areas)*, that will be identified applying qualitative criteria through participatory pilot plans in the next five years (Berlin Senate 2020).

In Eire, the city of Limerick, Green Leaf City 2020, has announced the adoption of the Hush City app and the organization of Hush City Soundwalks for involving residents to map tranquil spaces in and around Limerick City for the creation of the Limerick Plan of Quiet Areas (Jennings and Radicchi 2020).[2]

These examples, taken as a whole, suggest both potentialities and challenges of the soundscape approach. On the one hand, it can favour new forms of participation, the return to an 'intimate sensing' of places (Porteous 1990), the use of citizen science technology to mobilize citizen-generated data for public policy (Haklay 2012, Ponti and Craglia 2020). On the other hand, the implementation of the soundscape approach can face risks especially related to data quality and participation. Drawing on urban commons (Banerjee 2020) and citizen science, research and engaged scholarship may be useful to help overcome these challenges and contribute orienting agendas for the integration of soundscape and health in urban design and planning (Grant 2020).

## Placemaking and inclusion

Any substantive public health approach to placemaking must address health equity[3] (WHO, 2008). We wish to emphasize sound and the healthy city in relation to placemaking and the inclusion of special populations, such as youth, the elderly, and minority groups. Healthy placemaking can be characterized as an effort to understand people (and their feelings, attitudes, and behaviors) in relation to public spaces that promote psychosocial well-being. Arguably, place-making often involves altering a 'space' to be a 'place' – one that communicates inclusivity for all.

Depending on how they are perceived, city sounds can have significant negative effects on human health and psychological well-being. Studies in the field of environmental psychology have shown how noise from various modes of transportation (e.g., aircraft, trains, traffic) can affect executive function, health, and cognition in school children (Bronzaft and McCarthy 1975, Bronzaft 1981, Belojevic *et al.* 2012, Clark *et al.*

2013), and that our social identities can shape our perceptions of noise versus sound in public spaces (Shankar *et al.* 2013). Further systematic exploration is needed into how the frequency, intensity, duration, and meaning of urban sounds relate to city-dwellers' development of the psychological construct of 'sense of place'. Indeed, the growing use of a soundscape approach, accompanied by an increasing body of evidence associating environmental satisfaction and health in urban settings with noise perception, invites additional opportunities to examine the extent to which sound and sense of place interact.

Sense of place is a psychological construct defined as an emotional connection to a geographical environment, as well as to the values, symbols, and cultural meanings in a setting (Jorgensen and Stedman 2001, 2006). It includes three dimensions: place attachment, place identity, and place dependence. Place attachment is an emotional bond between an individual and an environment (Altman and Low 1992). Place identity is experienced when the attributes of a physical environment, such as acoustics, overlap with our identity in meaningful ways (Proshansky 1978, Droseltis and Vignoles 2010). Place dependence is formed when a range of behaviors that assist in goal attainment are afforded by a setting (Schreyer *et al.* 1981). Human mental health includes fostering a sense of place in everyday environments. Psychologically, people need to feel as though they belong somewhere (Giuliani 2003). Place attachment has been associated with cognitive restoration in children and appears to improve self-regulatory processes, perhaps by linking us to secure environments that aid in self-reflection, problem solving, and stress relief (Korpela *et al.* 2001). Attachment to one's neighbourhood tends to predict fewer perceived incivilities and a lower fear of crime (Brown *et al.* 2003).

New research concerning whether those who are strongly attached to a setting perceive noise to be as severe as those who are not as attached would be compelling, as would research examining whether severe noise perception in cities precludes place dependence, resulting in a lack of public vibrancy in an area. These connections would also afford cogent research questions about whether sense of place affects how members of more vulnerable special subpopulations feel about, and understand, city spaces.

## Streetscapes

Despite the expansion and densification of our cities, despite the towering heights of megacities and the scale of transit hubs moving hundreds of thousands of individuals per day through the expanding reaches of urban infrastructure, the city is still an environment *intended* for the scale of a human being to inhabit and move through. It is still a personal experience, no matter if one is ensconced in public transit forms, uses a ride-sharing app, rents a scooter or bike by the hour, or puts the sidewalk to use. This experience is often weighted with problematic sonic dimensions, perhaps most evident in the interaction between individual and streetscape.

In particular, the goal of urban 'walkability' is not new (Rafiemanzelat *et al.* 2017); nor indeed is the concern of the soundscape in cities (Southworth 1969, Schafer 1977). De Certeau's (1988) *Walking in the City* followed the concepts of soundwalks introduced by Southworth, Westerkamp and Schafer in the 1960s. Certeau brought soundwalking to a new audience of planners and designers in his work, proposing it as a new way to read, discuss, and understand the city (De Certeau 1988). The recent online publication in *Sound Moves* brings together a number of authors that continue to explore the ways in which urbanity, mobility, and the sound environment inform each other (Sound Moves, 2013). The texture and patterns of the city have become even more complex in the past 30 years; with the expanding modes of transit that today's cities offer, the mere act of walking today can at once refocus one's sensorial connection to the city as a personal and shared space.

Soundwalking as a practice is increasingly understood as a methodology capable of exploring our sensorial connection to the city and the meanings we derive within its soundscape. The recent codification of language and practice in an international standard has provided a position from which practitioners around the world can begin their work (ISO 2014, 2018), including the establishment of common terms, methodological approaches, and analytical best practices. The ISO standards provide guidelines; the actual practice of soundwalking has proven customizable to myriad contexts by varying aspects such as participant mix, recording technology, simultaneous data collection, and soundwalk paths (see for instance Adams *et al.* 2008, Drever 2011, McCartney 2014, Radicchi 2017b). It has even recently been proposed that the deliberate concentration and slow pace inherent to soundwalking can have potential health and mindfulness benefits (Behrendt 2018, p. 255). Soundwalking, as a simple practice in itself, can thus help us connect anew with our urban surroundings as well as ourselves.

As we continue to (once again) recognize the importance and vitality of a walkable city for all its inhabitants, ways of considering all of its sensorial contributions – such as soundwalking and soundscape study – will continue to offer valuable insights on how to make our urban environments and ecosystems more accessible, healthier, and enriching for every inhabitant.

## The ecology of urban soundscapes

Urban ecosystems are areas that are considered to be the habitat of people interacting with their environment, pets, garden plants, adapted animals and organisms (such as trees and birds and the micro flora and fauna) and pests (Bubolz and Sontag 2009, Douglas *et al.* 2015, Lawrence 2019).

Green spaces promote human well-being and health (Bertram and Rehdanz 2015), counteract the negative impacts of urbanization (Haaland and van den Bosch 2015, Shams and Barker 2019), improve biodiversity levels (Zhou *et al.* 2018, Wang *et al.* 2019) and create more desirable soundscapes (Jo and Jeon 2020). It is logical to assume that the degree of species diversity across many taxa (e.g. plants, birds, insects and the microbiome) is lower near the urban core where vegetation is in some cases absent (McKinney 2002) and higher in suburban and peri-urban areas (Blair 2001). Nevertheless, urban green spaces occasionally host a rich amount of species that sometimes exceed the amount of the ones found in less urbanized areas (Shwartz *et al.* 2014) due to the overexploitation of rural habitats (Goddard *et al.* 2010, Kowarik 2011). For that reason, urban green areas play an important role in sustainable cities (Jeon and Hong 2015). Furthermore,the acoustic environment is directly associated and highly influenced by the landscape structure (Liu *et al.* 2014). Biological sounds emanating from soniferous species formulate a desirable soundscape with several co-benefits, including the connection of urban dwellers with nature (Spendrup *et al.* 2016) and health restoration (Ghezeljeh *et al.* 2017).

Urbanization alters acoustic environments and affects both the integrity of ecosystems and the quality of human life (Farina *et al.* 2014), disconnecting urban dwellers from nature. It is the quantity, quality, connectivity, and accessibility of urban green spaces that benefit the well-being of city residents (Kabisch 2015, Sakieh *et al.* 2017), promote biodiversity, and lead to healthier more enjoyable soundscapes. The need to assess these effects has led to the creation of several metrics and acoustic biodiversity indices that monitor the dynamics of animal acoustic behavior (Farina 2018) and measure the degree of ecosystem stress in both natural and urban landscapes (Krause and Farina 2016). These acoustic biodiversity indices could be used in order to analyze soundscapes and characterize the contents of an acoustic environment by processing the variability of intensities associated with biophony (all the biological sounds similar to bird vocalizations) and anthropophony (human generated noise) (Pijanowski *et al.* 2011) registered in sound recordings. Soundscape metrics similar but not limited to the Normalized Difference Soundscape Index (NDSI) (Kasten *et al.* 2012, Fuller *et al.* 2015) and the Acoustic Complexity Index (ACI) (Pieretti *et al.* 2011) can contribute to the overall assessment of an acoustic environment, offering a new easier and faster way to evaluate biodiversity loss and predict ecosystemic changes that could eventually affect human health and wellbeing.

The acoustic perception and preferences of individuals are assessed by subjective assessments mainly through questionnaires, interviews, and other tools similar to soundwalking. These efforts produce valuable conclusions regarding the overall quality of the acoustic environment. Nevertheless, these subjective assessments are not enough for a holistic view regarding soundscape quality. Therefore, the inclusion of the acoustic biodiversity indices in a monitoring network regarding urban green spaces will offer a holistic view towards healthier, more resilient and enjoyable urban soundscapes. The above could be conjunctively used by urban planners and designers in order to contribute towards human well-being. Consequently, urban sustainability (Rehan 2016) could be achieved by means of ecological soundscape planning and design.

Finally, novel and non-invasive technological recording techniques could be used for the creation of monitoring networks in both aquatic and terrestrial ecosystems. These new technologies are now used for rapid biodiversity and soundscape quality assessments (Ducrettet *et al.* 2020) and even survey the impacts of climate change (Krause and Farina 2016, Sueur *et al.* 2019).

## New technology

With the continued advancement in smart technologies, many cities are implementing urban smart systems, aiming to support and achieve the UN Sustainable Development Goals (UN 2015) and improve quality of life in urban areas. The deployment of state-of-the-art wireless data networks has not only led to the exponential growth of smartphone use but also facilitates the fast delivery of media rich content, such as sound and video streaming. According to Statista, there are about 2.7 billion smartphone users in the world (Bankmycell 2020). A good example that leverages the ubiquitous presence of mobile phones is the assessment of the acoustic quality of urban space using smartphone mobile applications (mobile apps).

A review shows the increasing trend of using mobile apps as noise and soundscape assessment tools, highlighting that between 2008 and 2018, 34 mobile apps were developed as noise meter-based and/or audio recorder-based applications, allowing the collection of citizen-generated data (Radicchi 2019b).

Another trend in new technologies is ambient experience or multi-experience which, in essence, replaces technology-literate people with people-literate technology (Panetta 2019). Such technology creates immersive experiences by adopting augmented reality, virtual reality, immersive virtual reality, mixed reality, multichannel human-machine interfaces and sensing technologies. For example, researchers at the University of La Campania Luigi Vanvitelli utilized 360° video based immersive virtual reality technology as a tool for the participatory acoustic environment evaluation of urban areas in Naples (Puyana-Romero *et al.* 2017). Such new tools create near-realistic environments and can be used for assessing the proposed spatial and acoustical changes of urban areas within the context of new development or renewal processes. In comparison with laboratory-based experiments, these tools can allow the involvement of a higher number of participants (Hong *et al.* 2019), who can evaluate both the perceived soundscape and spatial qualities of the simulated environments (Ruotolo *et al.* 2013).

Another relevant trend in soundscape is human augmentation, which is the use of technology to enhance a person's cognitive and physical experiences (Panetta 2019). The former enhances our ability to think and make better decisions, whereas the latter allows us to extend our ability to sense the ambient environment in specific contexts. One interesting application, now being used in research, is 'Imaginary Soundscape'; this uses machine learning to pair pictures with sounds through the analysis of images and learning from a big data set (Vincent 2018). With such artificial intelligence, people can 'hear the sound' of images like paintings and photos. These technologies can also help engage the community and stakeholders in soundscape design (To and Chung 2018, 2019) and have been exploited to study underwater soundscapes for marine spatial planning and habitat-quality assessments (Marley *et al.* 2019).

With the ever-constant advancement of technology, it is dependent on scholars and researchers to keep up with new developments, in combination with their pre-existing knowledge, to create positive impacts. Through the integration of such new technologies and continued effort, there is tremendous potential to create living conditions with better sonic/acoustic environments that can meet – and even exceed – the expectation of citizens and other stakeholders, resulting in health and well-being benefits in urban areas.

## Sound art

Within the context of the soundscape approach to the healthy city, when approaching the role of the sound artist it can be helpful to reconsider the historical critique of putting the words 'sound' and 'art' together to refer to something arising within the rich performance practice of the 1960s – including Fluxus, Dada, Situationist International and Judson Dance Theater. John Cage, Annea Lockwood, Max Neuhaus and Maryanne Amacher operated among those providing a more sound-oriented approach to what artists Wolf Vostell and Allan Kaprow were exploring with urban routes and happenings: providing humans with the opportunity to perceive a 'slice of life' (Kaprow 1966), including how that might sound (Andueza Olmedo 2009, 2012, Flügge 2014, Anderson 2016). Max Neuhaus was (in)famously against the term sound art – choosing instead sound work, installation or sculpture – considering it absurdly inclusive and questioning whether what it circumscribes actually 'constitutes a new art form' (Neuhaus 2000).

The term soundscape, which is also applied abundantly and perhaps indiscriminately within descriptions of ambient electronic music or (modified) field recordings, also has its own body of critique. Tim Ingold, for example, argues against 'the scaping of things' with its focus on surface conformation, arguing that sound is not the object but the medium of our perception (Ingold 2007, p. 10). Furthermore, the term soundscape has now been undergoing a process of appropriation and conceptual standardization by a bureaucratic regulating body, the International Organization for Standardization (ISO 2014).

However, the words 'sound art' and 'soundscape' have proven robust enough to withstand the critique and are still widely used, their meanings becoming more honed through time and through the text of theoretical approaches.[4] For example, in relation to what might be thought of as the affective aspect of soundscapes, sound artists often place particular emphasis on working with the essence or mood of a place – whether called *spirit of place* (Lacey 2016, see also 'Placemaking and inclusion' above), haecceity or *thisness* (Stjerna 2018), urban ambiances (Thibaud 2011) or atmospheres, a 'tuned space' (Böhme 2017) – while researching how they might successfully work with the individual and combined possibilities of the sonic elements of a particular acoustic environment.

Keeping these descriptions in the back of our mind, let us consider the specific example of analyzing an urban area with the goal of improving the health and well-being of the inhabitants in terms of soundscape quality. When exploring the possible interventions that might be realized under commission by a community and in coordination with architects, an urban planner, etc., how could an artist help to distill out the most achievable and desired work? If a sound artist receives a specific and defining directive for a sonic work project – such as aiding with sound mitigation or creating an ambience specifically

designed to relax people – is that artist still functioning primarily as an artist, or are they actually operating more as an acoustic designer?

As suggested by Signorelli (2015) and Radicchi *et al.* (2018 p. 117–118), after at least fifteen years of multiple European research projects and national researches, there is still an urgent 'need of multidisciplinary approaches to evaluate the qualitative and perceptual peculiarities of the urban sonic environment' that can successfully guide possible interventions within the complex, stochastic processes that create an acoustic environment. In line with this, and specifically regarding urban sound art installations, there is a notable lack of understanding regarding the 'kinds of social effects and affects' that 'sound installation art configure[s]', as Christabel Stirling concludes as a result of her 'ethnographic fieldwork of three site-specific sound installations in London' (2016: n.p.). In alignment with this assessment, Jordan Lacey states that despite his experiential understanding of the 'interconnection attribute' – occurring 'when the senses and imagination merge with place, causing full integration between listener(s) and city' – as the optimum achievement of sonic art works, 'it is difficult to demonstrate its existence without a thorough analysis of visitor perceptions' (2016). Further ethnographic fieldwork and the implementation of models for analysing sonic environment perception are needed to better understand the impacts of sonic interventions, whether artistic or utilitarian, on the auditory environments people inhabit.

The idea of an *urban soundscaper* – a speculative function combining the role of an acoustic researcher and designer in combination with the skillset of a sound artist – might speak to these needs. An ideal researcher of the urban acoustic environment would be capable of providing a sonic mapping that would provide relevant insight into an acoustic environment and its connections to the health and well-being needs of its inhabitants, and an ideal sound artist would contribute a particular sonic sensitivity, fine-tuned skills regarding manipulating sound, and an understanding of how audiences react to sonic materials. An *urban soundscaper*, whether embodied as one individual or multiple people, would also ideally be capable of conducting ethnographic fieldwork that would indicate whether the intervention produced the desired effect, an aspect that is still rather lacking in current sound art installations or interventions. This idealized and speculative function would allow for the playfulness and acoustic sensitivity of an artistic approach while remaining connected to the goals and outcomes of an intervention that seeks to realise an actual improvement in the lives of urban inhabitants.

Finally, it is widely understood and often emphasized that the contribution of the sound artist is not limited to the creation of a sounding object or sonic intervention. One might consider the soundscape workshops of Hildegard Westerkamp, Pauline Oliveros's Deep Listening® practice (2005), Akio Suzuki's soundwalks that use offline media, Janet Cardiff's audio walks and installations and Peter Cusack's community soundscape projects and research as well as the site-specific presentations, performances and installations offered by the tuned city. As Elen Flügge states, 'sound art works (or sonic artistic practices) can encourage auditory conscientiousness and thus foster stronger concepts for the future of urban sonic environments [. . .] by revealing ways that urban spaces could sound as well as reflecting ways that we could listen'. Such works teach us to 'think with our ears' (2014, p. 1–2). If the goal is to share a joy of listening, then a sounding object is not particularly necessary and in many cases would be a much less expedient choice. Listening events are one of a sound artist's most treasured tools and would be an optimal practice for an *urban soundscaper*. Furthermore, developing a community of listeners and a listening practice are not only a vital precondition for the success of temporary or more enduring sonic works, they are vital to the success of, and inextricable from, the type of community interventions – arising from a socially-constructed smart city (Radicchi *et al.* 2017, p. 104) – that would actually function to make a city a more healthy place to live.

## Towards the integration of soundscape and health in urban design and planning

With the advent of the COVID-19 lockdown, did we develop a novel awareness about the acoustic environment? Did we act as a community of listeners?

A number of articles published during and after the lockdown have addressed the reaction of people towards the unusual quietude that characterized our world during the pandemic, inviting scholars and experts in the field to discuss the changes in the acoustic environment. For example, Sims (2020) reported that beyond an obvious reduction in crowds, road and air traffic, 'the Earth itself [was] even quieter: the Royal Observatory of Belgium has reported a reduction in seismic noise – the ambient hum of vibrations that travel through the planet's crust – as a result of reduced human activity.' The focus on the unusual quiet, which characterized the lockdown, was accompanied by the question whether this quietude would be maintained or not once people are back to normal.

But, is that quiet a good reference?

During the lockdown, the world was silenced due to strict measures imposed on citizens and communities to combat COVID-19 related health issues. If acoustical data collected during the lockdown showed that urban areas were usually quieter (Aletta *et al.* 2020),

how did people perceive that quietude in their everyday life? Some people may have felt a sense of relief from noise pollution, maybe some others associated that quiet and silence with a sense of desperation due to loneliness, confinement, loss of job or health problems (Letzing 2020).

So, shall we take that quiet as a reference in the current debate on the post-pandemic city? Or, maybe this allows us to open up to some new questions about our relationship to sound. What have we learnt about our relationship with sound by being forced to live in and listen to a silenced world? What have we learnt about the importance of sound for our health and well-being? What do we want the world to sound like in post-pandemic times?

As editors of this special issue we pose these questions for collective discussion and reflective discourse in the debate about the post-COVID City. In this editorial we have aimed to show how sound negatively and positively affects our health, well-being and the environment, and we have suggested that the integration of the soundscape paradigm into the noise-based approach can be key to effectively meet the WHO recommendations. We entreat the Public Health fraternity to take note. In the manner that they advocate Health Literacy (Kickbusch *et al.* 2013) across the professions, we ask of them to develop a sound literacy that goes beyond decibel values. A combinatory use of both quantifiable aspects of the acoustic environment and subjective evaluations provided by citizens can provide scholars, policy-makers and practitioners with appropriate tools and knowledge to more effectively integrate soundscape and health with urban design and planning. Such an approach, we argue, would imply combinatory actions – reducing noise, overcoming risky thresholds, protecting areas of high acoustic quality, creatively and collectively designing and managing the soundscape. This must be implemented through an interdisciplinary approach embracing participatory urban design and planning, psychology, ecology and the environment, slow mobility, mobile and digital technology, and sound art.

Urban designers and planners can co-create new projects addressing the material and immaterial qualities of the public space. They will need to involve people in analysing the effects of building materials, morphology, landscape, mobility patterns, etc. towards the goal of making healthier urban acoustic environments. They need an awareness of the immaterial cultural heritage of place – cultural events, festivals, sound marks and oral traditions, when dealing with the protection and renewal of the historical city. Innovative practice needs to see interdisciplinary researchers and practitioners working together in exploring the extent to which urban sound and the psychological construct of sense of place associate. Sense of place can alter our perceptions of urban settings in positive ways: knowing more about how place attachment, place identity, and place dependence associate with the ways in which people use, remember, and feel about cities will be important for more comprehensive and inclusive soundscape planning and management strategies. Integrating soundwalking and soundscape methods in the toolkit of mobility planners can help us consider the implications of the acoustic environmental quality for pedestrians and create urban environments that are accessible, healthier, and enriching for every inhabitant. Urban ecologists may now integrate acoustic biodiversity indices as rapid soundscape assessment tools that can offer early indicators associated with ecosystemic health and human well-being. Digital and virtual technologies need to be applied to promote the collection of citizen-generated data, such as feedback from stakeholders on how they perceive existing and potential future sonic environments. This is an essential element in supporting a more participatory governance of place. Integrating sound art in design and planning of the acoustic environment can help when conducting ethnographic fieldwork, indicating whether a soundscape intervention produced the desired effect. This speculative function would allow for the playfulness and acoustic sensitivity of an artistic approach while remaining connected to the goals and outcomes of an intervention that seeks to realise an actual improvement in the lives of urban inhabitants.

Leadership in healthier urban environments needs to be supported by the establishment of a transdisciplinary group of scholarly practitioners and engaged researchers in urban soundscape; this must include the public health community in addition to those in the built environment, creative and technical fields. The lack of a coherent multi-professional corpus is only to be expected. Society's attention to and understanding of urban sound is woefully inadequate. We have a vision of the creation of explorational and educational sound-based programs for young people (Bronzaft 2019). Let's build awareness about the acoustic environment as an urban commons; let's integrate soundscape and health into urban design and planning; and let's use emerging research and practice to influence behavioural changes in pursuit of urban health, now and for future generations.

## Notes

1. This soundscape project was a module of the project 'Nauener Platz – Remodeling for Young and Old' and it was curated by Prof. Dr. B. Schulte-Fortkamp, TU Berlin. The project was awarded the 2012 European Soundscape Award.

2. The participatory campaign was expected to be launched in April 2020 for the International Noise Awareness Day, but it has been postponed due to the COVID-19 pandemic outbreak.
3. Equity is the absence of avoidable, unfair, or remediable differences among groups of people, whether those groups are defined socially, economically, demographically or geographically or by other means of stratification. 'Health equity' or 'equity in health' implies that ideally everyone should have a fair opportunity to attain their full health potential and that no one should be disadvantaged from achieving this potential.
4. Drawing upon some prominent artists and thinkers who offer conceptualizations of sound art according to their own practice: Brandon LaBelle 'underscore[s] sound art as a practice (or field of practices) whose strategies are often focused on relating sound to additional materials, places, and persons; to expand our perspective onto the world through a deepening of the listening sense' (2015, p. 296). Åsa Stjerna emphasizes a non-anthropocentric perspective toward what she calls 'transversal processes in site-specific sonic practice' that experiences the 'artwork, places, cities and life [. . .] as affective processes that occur between bodies in encounter' (2018, p. 95). Jordan Lacey 'considers urban sound art installations as acts of "sonic placemaking", where placemaking is understood as localized interventions that create a sense of place by interconnecting communities and urban spaces' (2016) and perceives 'a site-specific sound installation to be a product of those relations that exist between the intentions of the artist, the existing environmental conditions and the social parameters of the site' (2016, p. 11). Marcel Cobussen 'defend[s] the claim that sound artists are also artistic researchers, given that they often systematically reflect on their own work as well as on the work of others; they – implicitly or explicitly – contribute to knowledge about our environment and how we perceive, experience, and evaluate it' (2019).

## Disclosure statement

No potential conflict of interest was reported by the authors.

## Credit authorship contribution statement

AR: Conceptualization – Writing: sections 1, 2, 8 – Review & Editing. PCY: Conceptualization – Writing: section 8 – Review & Editing. AC: Conceptualization – Writing: section 6, 8 – Review & Editing. PJ: Conceptualization – Writing: section 4, 8 – Review & Editing. SS: Conceptualization – Writing: section 7, 8 – Review & Editing. AT: Conceptualization – Writing: section 5, 8 – Review & Editing. LMC: Conceptualization – Writing: section 3, 8 – Review & Editing. MG: Conceptualization – Writing: section 8 – Review & Editing.

## Notes on contributors

*Antonella Radicchi* is a registered architect (IT) and holds a Ph.D. in Urban Design and Territorial Planning. She is Research Associate in the Institute of City and Regional Planning at TU Berlin, where she is the Principal Investigator of Hush City. She is Lead Guest Editor of the special issue Sound & the Healthy City for *Cities & Health*. Dr. Radicchi's research investigates public spaces' sensuous qualities through participatory walking methods and mobile technology. Her research was internationally awarded, inter alia, a Marie Curie Fellowship, a HEAD Genuit Research Grant and the National Institute of Urbanism Award for the Best Italian Dissertation in Territorial Planning.

*Pınar Yelmi* was born in Istanbul in 1985. Yelmi received her bachelor's degree from industrial design at Middle East Technical University (2008), her master's degree from Visual Communication Design at Politecnico di Milano (2012), and her PhD degree from Design, Technology and Society program in Koç University (2017). Yelmi is currently Asisstant Professor at Visual Communication Design Department in Işık University. Sheworked as industrial designer and graphical designer before her academic career. Her studies on the sounds of Istanbul have started during her Master's education. She conducted "The Soundscape of Istanbul" project and initiated "The Soundsslike Project", as her doctoral research.

*Andy Chung* is Chapter Representative of the East and South-East Asia Regional Chapterof ASA, and a member of the International Liaison Committee. He is Founding Fellow of the Macau Instituto de Acústica, Director of the International Institute of Acoustics and Vibration (IIAV), and a Corporate Member of Institute of Acoustics, and HKIOA. He is an author who has published papers in journals such as *Noise and Health, Environmental Pollution*, etc. and international conferences.

*Pamela Jordan* is a registered architect (USA) who uses acoustic methodologies to analyse built environments, such as ancient sanctuaries, places of worship, military installations, and infrastructural ruins. Her research has been supported by the Alexander von Humboldt and HEAD Genuit Foundations, the Netherlands Organization for Scientific Research, and the Society of Architectural Historians. She is also guest-editing an upcoming issue of *Change Over Time* dedicated to sound and heritage. Pamela holds master's degrees in architecture and historic preservation from the University of Pennsylvania and is currently a doctoral candidate at the University of Amsterdam's Centre for Ancient Studies and Archaeology.

*Sharon Stewart* studied at the Utrecht School of the Arts, Faculty of Music, and the Royal Conservatoire, The Hague. She has a private piano practice in Arnhem, creates (electroacoustic) sound works and installations, serves as Associate Editor of the *Journal of Sonic Studies* and is currently an independent researcher for the Professorship Theory in the Arts at ArtEZ University of the Arts in the Netherlands. She was introduced to DeepListening® by founder Pauline Oliveros, IONE and Heloise Gold and is currently a coreteacher for the online program offered by the Center for Deep Listening at Rensselaer Polytechnic Institute.

*Aggelos Tsaligopoulos* is a PhD (c) on the Department of Environment - University of the Aegean. Currently he works as a researcher in the Acoustic Ecology Laboratory and a part time lecturer in the Department of Environment - University of the Aegean. The main focus of his research is the concept of ecological quietness in an urban context.

*Lindsay J. McCunn*, PhD is an environmental psychologist and Professor in the Department of Psychology at Vancouver Island University in Canada where she is the Director of the Environmental Psychology Research Lab.

Dr. McCunn is an Associate Editor of the *Journal of Environmental Psychology* and the Commissioning Editor for *Cities & Health*. She is also the Chair of the environmental psychology section of the Canadian Psychological Association. Dr. McCunn's research focuses on the extent to which people experience sense of place in a variety of settings, such as offices, neighbourhoods, hospitals, prisons, schools, as well as parks and protected areas.

*Marcus Grant* is Editor-in-Chief of *Cities & Health* and former deputy director of the World Health Organisation's Collaborating Centre for Healthy Cities. With a background in ecological systems and urbanism, he is a practitioner scholar for healthy urban planning, healthy placemaking and planetary health. Marcus is an expert advisor to the WHO and UN-Habitat, a contributor to "Health as the Pulse of the New Urban Agenda' and author of the WHO UN Sourcebook: Integrating health into urban and territorial planning. Marcus is a Fellow of the Faculty of Public Health, a member of the Landscape Institute and is based in Bristol, England.

## ORCID

Marcus Grant http://orcid.org/0000-0002-7838-8725

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