



“You are on mute”: the impact of indoor soundscape on sexual well-being during the COVID-19 lockdown

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ABSTRACT

Sexual well-being is a fundamental facet of the overall well-being of most individuals and implies the ability to have safe and pleasurable sexual experiences, beyond the absence of disease or disturbance. The extent to which people can achieve sexual well-being depends, among other

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aspects, on whether they live in an environment that promotes and support it. The present study focuses on the unexplored impacts of the perceived acoustic environment (i.e., the soundscape) on human sexual activity carried out in domestic settings. Verbal descriptions have been gathered from open-ended questions included in a survey administered to 848 respondents living in the UK (London area) and in Italy in January 2021 during the COVID-19 lockdown. Thematic analysis was used to extract a framework detailing the positive and negative impacts of the acoustic environment on sexual activity. The results show the mechanisms by which the acoustic features of the environment can impact on the sexual experience in terms of privacy, distraction, disruption or support, up to trigger coping strategies (e.g., controlling windows, playing music) and behavioural changes (e.g., lowering the volume of the voice) that can in turn limit or enhance the freedom of sexual behaviour, affect or foster sexual well-being.

1. INTRODUCTION

The quality of the built environment can affect the health and well-being of building occupants [1,2]. If the recent emphasis on the “healthy buildings” movement is driving research towards the definition and characterization of appropriate housing conditions, much remains to be done to understand how buildings mediate and moderate the relationship between the environment and human health and well-being [3].

Regarding the impacts of the acoustic environment on humans, soundscape research gives new value to the acoustic phenomenon by linking it not only to the issues of noise pollution, annoyance and mitigation, but by acknowledging its significance and potential to provide positive outcomes [4,5]. While historically rooted in the context of urban planning, soundscape research has recently been applied to the indoor built environment (here referred to as “indoor soundscape” [6]) to characterise the impact of acoustic conditions on occupants and to guide the design of spaces that support activities and improve well-being and quality of life [7,8].

Sexual well-being is a fundamental facet of the overall well-being of most individuals. It is part of the broader concept of “sexual health”, defined as “*a state of physical, emotional, mental and social well-being in relation to sexuality, [...] not merely the absence of disease, dysfunction or infirmity*” [9]. Sexual well-being implies the ability to have safe and pleasurable sexual experiences, and it depends, among other aspects, on whether the surrounding environment promotes and supports it. While previous research has focused on the impacts of the policy and social environment, the present study focuses on the unexplored impacts of indoor soundscapes on human sexual activity carried out in domestic settings. The analysis builds on verbal descriptions that have been gathered from an online survey administered to 848 respondents living in the UK (London area) and in Italy in January 2021 during the COVID-19 lockdown. The study aims at 1) identifying the variables within the acoustic environment linked to sexual well-being and 2) the mechanisms through which those variables exert their influence.

2. METHODS

An online survey was conducted in January 2021 through Prolific participant pool, in order to assess the impact of the acoustic environment on homeworkers living in the UK (London) and Italy during the COVID-19 lockdown. The survey involved 464 respondents in London and 384 respondents in Italy and consisted of five main sections covering: (1) work-from-home (WFH) activity; (2) leisure activities performed at home; (3) housing characteristics; (4) urban context; and (5) person-related traits. The questionnaire included both closed and open-ended questions. A detailed description of the study design can be found elsewhere [10].

The present study focuses on the analysis of qualitative responses given by participants to the question: “*In your view, how is the sound environment currently (positively and negatively) affecting your leisure activities at home? (e.g., heard noises and sounds, building characteristics, urban environment)*”, in particular to the sub-question addressing the impacts on sexual activities at home. Given the sensitive nature of the topic, the answer to the question was kept optional. The

research was approved via the UCL IEDE Ethics departmental low-risk procedure on November 26th, 2020.

Overall, 345 responses were collected from the UK sample and 274 from the Italian sample. Thematic analysis was employed as a method to identify patterns of meaning across the data set (i.e., themes) that are important in relation to the research question being explored [11]. Codes and themes formation followed a combination of inductive and deductive approaches, as those were based on the description of participants' own experiences, but also drew on the theoretical soundscape framework described in ISO 12913-1 standard [12]. Thematic maps were built to visualize main themes, sub-themes and their interrelations [13].

Coding was performed in NVivo software, and an example of the coding process and theme formation is reported in Table 1.

Table 1: Example of the process leading from coding to theme formation

Excerpt	Codes	Sub-themes	Theme
<i>Occasionally <u>we can hear our neighbours through the walls upstairs and this can be off-putting.</u></i>	Neighbours' noise gives a negative impact		
<i><u>La musica aiuta a creare la giusta atmosfera con il partner.</u></i> (Music helps to create the right atmosphere with your partner)	Music gives a positive impact	Sound type	
<i>On the plus side, with the window open, there is <u>plenty of traffic noise to muffle sex noise.</u></i>	Louder environment is preferred		Characteristics of the acoustic environment
<i><u>Nei momenti di intimità la nostra casa è silenziosa. Questo favorisce l'intesa sessuale. Non ci sono fonti di distrazione.</u></i> (In intimate moments our home is silent. This favours sexual understanding. There are no sources of distraction.)	Quieter environment is preferred	Loudness and quietness	

3. RESULTS

Final themes resulting from the analytical process are schematically presented in Table 2 and conceptually linked in the thematic map in Figure 1.

INDOOR SOUNDSCAPE AND SEXUAL WELL-BEING

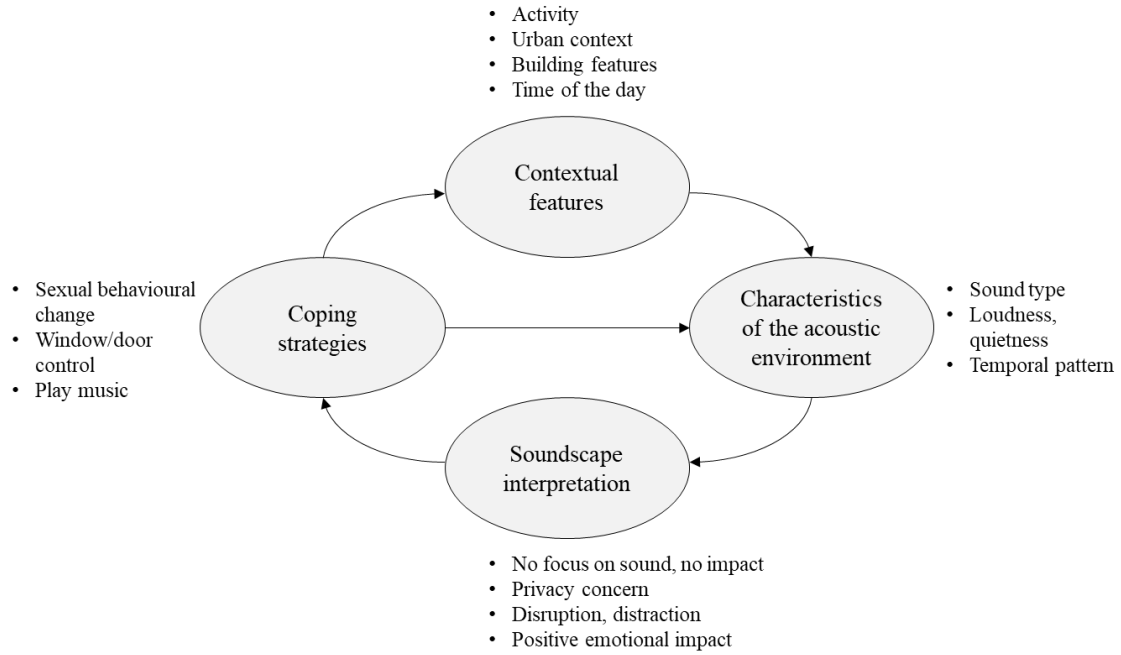


Figure 1: Thematic map on the relationship between indoor soundscape and sexual well-being showing themes (within boxes) and sub-themes, together with their causal interconnections

Emerging themes and their interrelationships were similar between the UK and Italian samples. For each theme, a short description is provided, together with sample excerpts.

Table 2: Summary of themes extracted from the thematic analysis

Theme	Excerpts	Description
Contextual features	<p><i>Noise is not an issue as <u>walls have insulation</u> and can keep sound from travelling.</i></p> <p><i>Because I live in a <u>big house</u> this is not a problem.</i></p> <p><i>It does not affect it as much. Usually <u>due to the time we have sex, it is quieter so less or no noise from neighbours and outside.</u></i></p> <p><i>Ecco, è un 'punto dolente', <u>l'ambiente circostante è talmente tranquillo che certi suoni, specialmente nottetempo, potrebbero essere causa di imbarazzo.</u></i> (Here, it is a 'sore point', the surrounding environment is <u>so quiet</u> that certain sounds, <u>especially at night</u>, might cause embarrassment)</p>	<p>Contextual aspects include activity (i.e., sexual activity), the quality of the urban area and housing (i.e., house size, construction quality), and the time of day when sexual activity takes place. Good building construction is associated with adequate sound insulation of the building elements. Since sexual activity often takes place in the evening or at night, these are the times when the external acoustic environment is usually quieter (less traffic, construction sites not in operation). Contextual aspects contribute to influence the acoustic environment at home.</p>
Characteristics of the acoustic environment	<p><i>We can hear every single cough, sneeze and snore that my <u>elderly neighbour</u> makes in her bedroom. That is alongside every conversation on the phone and tv, as well as when she turns on the light. It's quite a <u>passion killer!</u></i></p>	<p>The characteristics of the acoustic environment mainly concern the type of sound, sound dominance and temporal patterns. The sounds most often mentioned are those of other people, whether neighbours, family members or housemates, and music</p>

Soundscape interpretation

Sometimes distracting noise from others in the house.

Birds chirping from time to time and river are having positive impact.

Positive sound environment. It is quiet and not much noise so we don't get disturbed.

Rumori improvvisi e/o il suono di gente che parla, anche se distanti, azzerano il desiderio.

(Sudden noises and/or the sound of people talking, even if distant, reset the desire.)

I have control over my sound environment and can play music, put on TV, etc.

In quelle occasioni l'ambiente sonoro non è una mia priorità e non arriverebbe a influenzare la cosa.

(On those occasions the sound environment is not my priority and would not come to influence it.)

Don't pay attention to external factors when engaging in sex.

Preferisco non avere rumori che mi distraggano (voci, suoni ripetuti)

(I prefer not to have distracting noises (voices, repeated sounds))

Il mancato isolamento potrebbe creare imbarazzo.

(A lack of sound insulation may cause embarrassment.)

The bedroom is quite close to the corridor so I am sometimes concerned with neighbours hearing this.

It makes me wonder whether me and my partner can be heard by neighbours and others in the house as I am aware of the sounds I am able to hear on a day to day basis.

fear of being overheard by children is always at the back of the mind.

I do worry that my housemates will be able to hear me and my partner which can be frustrating

I feel with freedom and not interrupted or feeling that I am disturbing anyone.

Durante le attività sessuali la musica mi influenza in modo positivo.

(During sexual activities, music influences me in a positive way.)

played by the participants themselves during sexual activity. To a lesser extent, traffic noise, sounds of nature or sounds generated by the sexual activity itself are reported.

Other aspects concerning the acoustic environment are the degree of quietness or loudness in the environment and the temporal characteristics of the sound phenomenon, such as the presence of sudden or repetitive noise.

The contextual and acoustic features contribute to determine soundscape interpretation.

For many, the acoustic environment is not influential. This is explained as a focus on the activity that allows to get away from the surrounding environment and to “block out” external sounds.

For others, sounds other than those generated by sexual activity can disturb, distract and interrupt the sexual activity itself, such as in the presence of voices or sudden noises.

Sounds related to the presence of people (children at home, neighbours, housemates) generate embarrassment, frustration and concern for privacy, as hearing someone is synonymous with being heard.

On the contrary, the availability of a quiet and adequately sound insulated environment, the presence of positively perceived sounds (e.g., natural sounds and music) can help to shape a private and intimate context in which to experience sexual activity. This would provide a positive impact on emotion and behaviour, allowing to focus on the sexual intercourse, without concerns or distractions, and with freedom of expression.

Coping strategies

I would keep windows closed because otherwise you can hear neighbors and they can maybe hear you.

I can often hear people outside my bedroom window which can make me feel self-conscious during sexual activities and sometimes make me decide to stop.

The awareness of sound spillage between the flat does affect negatively the freedom to engage in sexual activities without having to worry about being quiet.

È irritante sia per me che per mio marito sapere che i vicini sentono tutto, per cui a volte limita orari e esuberanza
(It is irritating for both me and my husband to know that the neighbours hear everything, so this sometimes limits schedule and exuberance.)

Devo sempre mettere un sottofondo di musica per non sentire e non far sentire.
(I always have to play background music so that I don't hear and don't let people hear.)

I have control over my sound environment and can play music, put on TV, etc.

If soundscape interpretation results in perceived disturbance and lack of privacy, this would motivate behaviour.

Coping strategy includes opportunities to control the acoustic environments, such as closing doors and windows, playing music, or turning on TV.

Notably, playing music helps to tailor the atmosphere by covering up any unwanted noise that may be present. Moreover, music and TV sounds help to generate some background noise, providing masking opportunities against the sounds generated by sexual activity, thus improving privacy.

If control actions are not feasible or not sufficient, adverse acoustic conditions lead to a behavioural modification of sexual activity, such as adapting and limiting sexual intercourse in order to be quieter, or even stopping it.

Behavioural actions thus may change the context (e.g., the sexual activity itself) and the acoustic environment (e.g., background noise level), as conceptually depicted in Figure 1.

3. DISCUSSION

The thematic analysis offered insights into patterns of meaning across the data set, with the aim of identifying the variables linked to sexual well-being and the mechanisms through which those variables exert their influence. The use of qualitative methods to deepen the understanding of soundscapes is recommended by the ISO/TS 12913-3 technical specification (Annex C), and numerous examples can be found in the literature (among others, see for Grounded Theory [14–16]). In the present study, four main themes were extracted.

The first theme concerns the temporal and spatial context where sexual activity takes place. The type of dwelling and building construction, the urban area and the time of day are variables which can influence the acoustic environment surrounding the occupants during the sexual activity. The second theme concerns the acoustic environment, which is composed of a variety of sounds and noises, mentioned as meaningful events in relation to their source, intensity or time pattern, in addition to those generated by partners involved in the sexual intercourse. Notably, sounds generated by other human beings (neighbours, housemates), were found to be particularly critical for soundscape interpretation, the third theme extracted. Hearing sounds of other people was generally associated with awareness of poor sound insulation of building components and, therefore, with being heard. This caused a feeling of embarrassment, self-consciousness, lack of intimacy and privacy. Other sounds, typically with a sudden or repetitive nature (e.g., traffic noise and sirens), were perceived as distracting and disturbing, diverting attention from the activity or off-putting the atmosphere. For many, the focus on sexual activity allowed them to distance themselves from the surrounding sound environment, thus simply ignoring it and reporting no impact. The availability of a quiet space, properly sound insulated, the presence of natural sounds and music, allowed to shape a private and comfortable environment in which to freely enjoy sexual activity.

The fourth extracted theme was related to coping strategies. In the case of negative affective outcomes, the acoustic environment triggers behavioural responses to bring the surrounding environment back to comfortable conditions. Behavioural responses include controlling doors and

windows, playing music or turning on the TV as strategies for sound masking. Playing back music can be useful both to tailor the atmosphere, in presence of disturbing noise sources, and to increase privacy, thus masking sounds generated during the sexual intercourse. If possibilities of control over the environment are limited or not sufficient to reach comfort conditions, the sexual activity is modified and remodelled in order to be quieter, leading in extreme cases to stop the activity itself. Coping strategies therefore modify the context, e.g., the sexual activity, or the acoustic environment, as conceptually depicted in the thematic map showed in Figure 1.

The themes extracted from the analysis (i.e., context, acoustic environment, soundscape interpretation, response) and their interconnections reflect the process of perceiving and responding to the acoustic environment as described by the soundscape framework provided in standards [12] and in Grounded Theory models available in the literature [14–16]. In case of indoor and residential environments, however, the perceptual dimension of privacy and control over the environment is key. The findings of the present study align with previous research that identifies privacy and perceived control as fundamental aspects underpinning the affective response to acoustic environments in domestic settings [6]. Moreover, the availability of control actions is a central element to turn dissatisfaction into pleasure, according to mechanisms illustrated in Indoor Environmental Quality research [17]. However, it should be noticed that the lack of quietness and adequate sound insulation can result in poor acoustic conditions, that are able to compromise building occupants' sexual well-being. Consequences range from annoyance to frustration to restriction of freedom of sexual expression, by sound-constraining the sexual activity.

4. CONCLUSIONS

The present study analysed material collected from an online questionnaire administered in the UK and Italy during the COVID-19 lockdown. Responses to an open-ended question regarding the (positive and negative) outcomes of the sound environment on sexual activity were analysed through thematic analysis in order to 1) identify the variables within the acoustic environment linked to sexual well-being and 2) the mechanisms through which those variables have an influence. Four themes were extracted, concerning contextual features, the characteristics of the acoustic environment, soundscape interpretation, and coping strategies.

As regards the acoustic environment, the main variables were related to the type of sound (i.e., neighbours' noise, music), sound dominance (i.e., loudness, quietness), and temporal patterns. Those were in turn determined by contextual features, such as the performed activity (i.e., sexual activity), the quality of the urban area and housing (i.e., house size, construction quality), and the time of day when sexual activity takes place.

While the focus on sexual intercourse can sometimes inhibit the contact with the surrounding sound environment, the interaction with the acoustic environment can be at times beneficial or detrimental. Results show the mechanisms by which the acoustic features of the environment can impact on sexual well-being in terms of privacy, distraction, disruption or support, up to trigger coping strategies (e.g., controlling windows, playing music) and behavioural changes (e.g., lowering the volume of the voice) that can in turn limit or enhance the freedom of sexual behaviour, affect or foster sexual well-being.

The framework provided by the ISO 12913-1 standard, based on the analysis of context, acoustic environment, human perception and behavioural response to the acoustic environment, revealed once more beneficial to assess the perceived sound environment in its complexity. Despite a vast part of the literature having already investigated the impacts (especially the negative ones) of exposure to the acoustic environment (especially noise) on human health and well-being, this study adds an extra piece of evidence on an area that has not been investigated so far, such as sexual health and well-being. This evidence can lead to a deeper understanding of the broader array of impacts of the sound environment on the health and well-being of building occupants. The soundscape approach can help to understand and account for the effects of inadequate acoustic conditions and the benefits of adequate acoustic design in terms of quality of present sounds,

quietness availability, acoustic performance of building components, thus fostering a prioritization of acoustic design at both urban and building scale.

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