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HETEROTOPIA WORK: Correlation Between the Domestic Built Environment and Home Offices During COVID-19 Confinement

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ABSTRACT

The new COVID-19 context has transported work to a domestic setting. These new locations, heterotopic, do not always adequately respond to user needs. This paper explores the relationship between the domestic built environment and certain elements that shape it, the perception, emotional state and productivity of the users. A pilot case study was carried out with 11 volunteers who evaluated their home offices for seven work days using physical environment tools, two tests -fixed data and daily evaluation- . Also, environmental parameters of the territory were monitored. Among the main findings, we observed that the perception of size does not relate to actual size; a balcony is associated with happiness and calm. We have verified how biophilic elements promote well-being. Happiness and calm are related to hight and low levels of lux. There is a tendency of happiness associated with collaborative tasks, and calm with individual ones. This article opens up a path for exploratory research on resilient situations in which physical barriers force people to seek creative solutions and offers tools to empower users. Current trends in data-driven design and teleworking support research proposals like this one, with a focus on well-being, productivity.

Keywords: Built environment, COVID-19 confinement, Emotions, Home office, Perceptions, Well-being

INTRODUCTION

The interaction between the built environment and human beings is based on the exchange of information via the distinct physical environment parameters of the surroundings and human beings. As creative disciplines, design and architecture enable an efficient configuration of one's environment to improve and support full well-being for human beings at all levels. These physical-environmental parameters must be controlled to ensure that they are within people's comfort ranges and to promote well-being and quality of life as their consequences and effects can actually impact health (Barrett, Barrett, and Davies, 2013).

The current COVID-19 pandemic is rapidly reconfiguring the way spaces are inhabited as a result of measures such as confinement, social distancing, and the reduction of movement. Moreover, studies are already being carried out that link physical environmental aspects with the virus, such as contamination levels and the spread of the disease (Centre for Research on Energy and Clean Air, 2020).

The measures taken by various entities and governments have produced a complete physical barrier during this period for all citizens, in which their work life has been restricted to the domestic sphere. This other, improvised work space, created by necessity, coincides with Foucault's (1967) concept of heterotopia, or heterogenous spaces in social and cultural terms due to the search for juxtaposition, combining different components, discontinuities, and the hybridization of various incompatible spatial elements within a real space, creating a particular microcosm (Martin et al., 2015; Çalışkan, Ribeiro and Tümtürk, 2020). A real place in which incompatible spaces are juxtaposed (García Alonso, 2014).

The above refers not only to the space itself, but also to the multiplicity of experience and aesthetic judgment through communication technologies (Vattimo, 1992), terms that encompass these "other" workplaces and their relationship with the people who inhabit them.

By the end of 2021, 25-30% of the workforce is expected to work from home several days a week (Global Workplace Analytics, 2020) and 75% of CFOs expect to transfer former on-site employees to remote work following the COVID-19 pandemic (Gartner, 2020), making it necessary to understand the compositions and configurations of these domestic spaces with a view to ensuring solid performance from and the well-being of their inhabitants.

The inequality present in terms of different housing formats and qualities is a reality, as is the fact that not everyone has access to quality space, especially due to the cost of living in large cities.

In terms of well-being, quality includes good natural lighting, thermal and acoustic insulation, resistant and toxic-free materials, placement in relation to the sun's path, and size, not only in terms of square meters, but also cubic meters. These characteristics do not always depend on the end user. However, there are other elements that do depend on the user, which can help and contribute to well-being, such as aspects regarding biophilics, aesthetics, maintenance, and the choice of healthy products insofar as chemicals such as textiles, leather, agglomerates, and so on are considered. All this influences the perception that people may have of their own spaces and their physical and psychological health. Some reports on trends are already attesting to certain points of tension in home offices, such as a lack of space, nature deficit, physical health and hygiene issues, and simultaneous video calls within the same space (Trends Club by Cenfim, 2020).

This is why empowering users with knowledge about this topic is a necessity, as is understanding what these parameters mean, what value they have, how they affect people, and how they relate to one another, not only on a physical level, but also on an emotional level. This empowering can be achieved through simple, easy-to-use everyday technology tools such as mobile phones.

Although emotions are a complex dimension for human beings, there is evidence and literature that make it possible to classify them to distinguish one from another (Abella Garcia, Clèries Garcia, and Marco-Almagro, 2020). One way is through the arousal-valence model, which frames emotional experiences in two terms: valence –positive or negative affective quality– and excitement –how relaxing or exciting the information is– (Rubin and Talarico, 2009).

The objective of this pilot study is to explore the relationship between the domestic built environment and certain elements in its configuration, the perception and emotional state of

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users, and their performance –types of activity and cognitive aspects– during COVID-19 confinement. Furthermore, it aims to contribute to the processes of obtaining scientific data that may impact project processes, ergonomics, and design guidelines focused on well-being.

Within the context of the current crisis, this study has unfolded as a resilient research case study in which the available resources and the barriers due to the situation are a driving and innovative force for creating interesting research methodologies with everyday elements to collect data.

1. METHOD

To achieve the objective set out for this article, an exploratory pilot case study was developed and applied in three countries: Spain, Sweden, and Chile. In order, to explore the possible differences and check that this methodology can be used in different contexts, as a response to the globality of the problem.

The participants included 11 volunteers -7 from Spain, 3 from Chile and 1 from Sweden-. Eight of whom were women and three of whom were men, between 25 and 65 years of age. All of them live in an apartment located in different cities. As this research was a pilot study in an emergency context – with uncertainty about the duration of lockdown – the sample is small but enough to validate the methodology used and extract some conclusions about the topic.

The tools used consisted of: a fixed data sheet, DS1, and a daily data sheet, DS2. The first provides information corresponding to the parameters, such as: form, biophilia, artificial lighting, colors, and predominant materials, among others.

Heterotopia DATA SHEET 1
WORK FIXED DATA

Participant name	Occupation

Parameters	Sub-parameters			Perception							Emotion				
					1	2	3	4	5		Calm	Happiness	Disgust	Sadness	Neutral
FORM	Overall size			Small						Big					
		YES	NO												
	Terrace or balcony			Small						Big					

		YES	NO		1	2	3	4	5		Calm	Happiness	Disgust	Sadness	Neutral
BIOPHILIA	Nature views			A few						Several					
	Plants inside home			A few						Several					

ARTIFICIAL LIGHTING	Color temperature	WARM	COLD		Calm	Happiness	Disgust	Sadness	Neutral	
	Space1									
	Space2									
	Space3									

COLORS		NAMES		1	2	3	4	5		Calm	Happiness	Disgust	Sadness	Neutral
	Space1		Colorless						Colorful					
	Space2													
	Space3													

MATERIALS	Which material do you like the most or attracts your attention most in your space?	

TEMPERATURE	Do you have air conditioning?	YES	NO

		YES	NO		1	2	3	4	5		Calm	Happiness	Disgust	Sadness	Neutral
WORK	Have you ever teleworked before?			Sporadically						Constantly					

Figure 1. Example of DS1 fixed data sheet.

In contrast, the daily evaluation sheet, DS2, facilitates evaluating data from the environment, such as lighting (lux and type of lighting), noise (dB), and temperature, as well as activity and certain cognitive aspects such as creativity, productivity, concentration, and general satisfaction.

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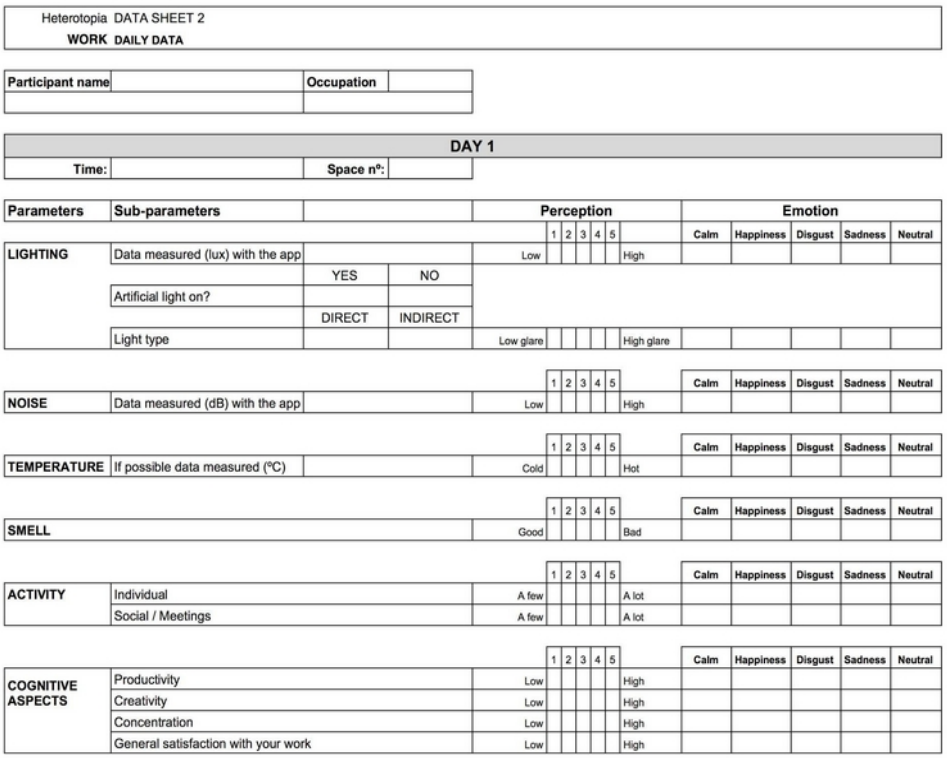

Heterotopia DATA SHEET 2
WORK DAILY DATA

Participant name		Occupation	

DAY 1

Time:		Space nº:	

Parameters	Sub-parameters			Perception							Emotion				
					1	2	3	4	5		Calm	Happiness	Disgust	Sadness	Neutral
LIGHTING	Data measured (lux) with the app			Low						High					
		YES	NO												
	Artificial light on?														
		DIRECT	INDIRECT												
	Light type			Low glare						High glare					
					1	2	3	4	5		Calm	Happiness	Disgust	Sadness	Neutral
NOISE	Data measured (dB) with the app			Low						High					
					1	2	3	4	5		Calm	Happiness	Disgust	Sadness	Neutral
TEMPERATURE	If possible data measured (ºC)			Cold						Hot					
					1	2	3	4	5		Calm	Happiness	Disgust	Sadness	Neutral
SMELL				Good						Bad					
					1	2	3	4	5		Calm	Happiness	Disgust	Sadness	Neutral
ACTIVITY	Individual			A few						A lot					
	Social / Meetings			A few						A lot					
					1	2	3	4	5		Calm	Happiness	Disgust	Sadness	Neutral
COGNITIVE ASPECTS	Productivity			Low						High					
	Creativity			Low						High					
	Concentration			Low						High					
	General satisfaction with your work			Low						High					

Figure 2. Example of DS2 daily evaluation sheet.

On both sheets, all the data is linked to perception on a scale from -2 to 2 (1 to 5) (Likert, 1932) and emotional states are categorized according to the Arousal-Valence graph (Rubin and Talarico, 2009):

- Calm: only calm.
- Happiness: surprise, adoration, admiration, fun, love, satisfaction, interest, sympathy, aesthetic appreciation, and curiosity.
- Disgust: anger, envy, horror, angst, disgust, fear, anxiety, and shame.
- Sadness: empathetic pain, boredom, confusion, and nostalgia.
- Neutral.

Mobile apps were used to measure lighting in lux and noise in dB.

Finally, a daily atmosphere monitoring sheet for the territory was used, with data on temperature, relative humidity, and air quality. These data were obtained from online platforms[1 2].

1.1. Procedure

An explanatory presentation is made to the participants and they are asked to carry out the following actions:

- Read the instructions in the project presentation dossier.
- Read and sign the informed consent form.
- Download the Noise and Lighting Evaluation Apps and try them out.
- Fill in form 1 (DS1).

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- Send a photograph of each domestic workplace.

The data sheets are shared through the cloud platform.

1. The day after receiving everything requested for the first phase, the daily evaluations of the domestic workspaces with the DS2 sheet begin, for seven business days. Participants are told the most appropriate hourly ranges to take measurements in order to have greater information regarding their performance during the day.

2. Because the forms are completed online, and to avoid subsequent changes in the information provided, the previous day's data sheet is saved in pdf format the day after each evaluation.

In parallel, general data on the physical environment parameters of the different spaces were monitored twice daily, at 10:00 am and at 6:00 pm in each participant's local time. Finally, we requested that the participants compare their regular office space with their home workspace based on the same parameters.

It is worth noting that this study was carried out during different seasons, spring in Europe and autumn in South America.

2. RESULTS

2.1. Spaces, elements, and materials

Materials such as wood, leather, slate, ceramics, and textiles stand out. The most significant colors are in hues of beige, gray, black, yellow, maroon, green, and terracotta.It is worth mentioning that the material participants liked or were attracted to most was wood, with six different evaluations. It may be for this reason that a greater trend was observed in the use of wood, a material that has positive characteristics that affect people's well-being (Nyrud, Bringslimark and Bysheim, 2014).

We observed that dining rooms, living room sofas, dedicated home offices in some cases, and, in only one case, a bedroom with an element used as a provisional desk were the main spaces and objects used in this case study (see Figure 4).

In general, people tend to prefer places near windows (Park et al., 2018), and as seen in this pilot study, some of the participants strive to work in places that are near windows, either due to the views or natural light.

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Figure 3. Moodboard of materials and colors in the spaces.

Figure 4. Moodboard of elements, materials, and colors by space.

2.2. Correlations of interest

The correlations of interest that have been analyzed in this pilot study are:

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- Form – sizes and the existence of an external space – and productivity.
- Biophilic aspects – views of and having plants – and creativity.
- The color temperature of the lighting and the participant's opinions.
- Each participant's prior experience with working from home and their general satisfaction with it.
- The parameters of the environment over time – acoustic, visual, and thermal.
- Lighting and creativity.
- Individual activity in relation to social activity.
- Cognitive aspects as a whole –productivity, concentration, creativity, and general satisfaction–.
- Data on the space related to temperature, relative humidity, and air quality.

In all cases, parameters and behaviors alike are associated with perception and emotional states.

2.2.1. Form and productivity – biophilia and creativity

The size of the homes evaluated varied between 45 m2 and 130 m2, with an average of 80 m2. As can be seen in Figure 5, the average perception of size was 0, neither large nor small, and the predominant emotions were calm and happiness. The form and distribution of interiors in office buildings makes workers feel greater satisfaction in smaller, controlled spaces (Park, J. et al., 2018). Comparing this information with the data obtained in this study, the perception of size may be less relevant as our research involved private spaces.

In addition, all participants had a terrace or balcony, producing happiness and calm above all. Size was perceived as neutral, with a tendency towards small. Average productivity stood at 0.68, which can be attributed both to size and to having an outdoor space.

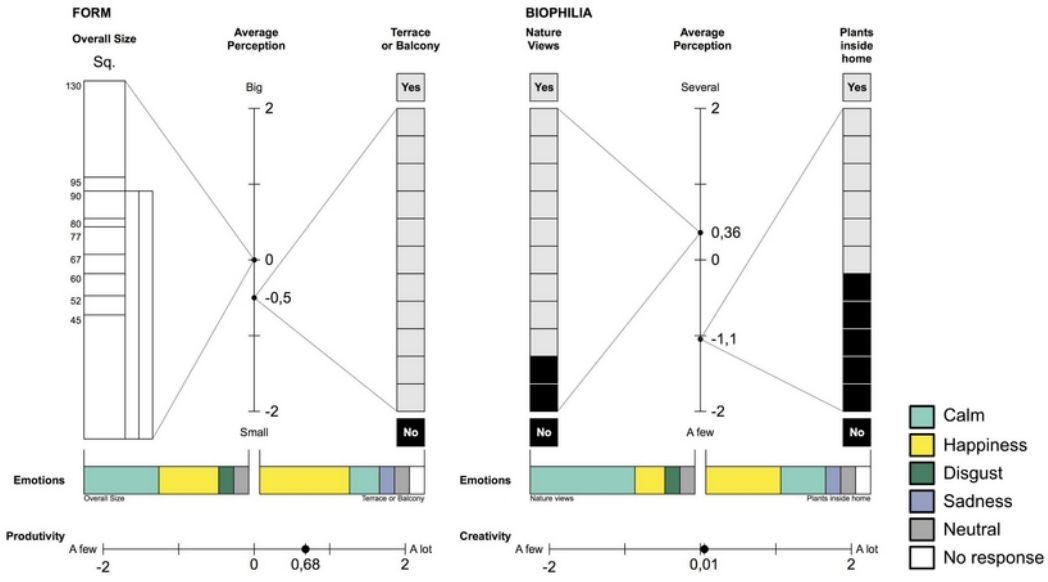

Figure 5. Form and productivity - Biophilia and creativity

There are studies that show that biophilia and the addition of natural elements in indoor spaces can lead to positively valued changes in cognition and emotion (Grinde and Patil,

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2009). Regarding these biophilic aspects in the current study, nine cases present views of nature, which primarily produce calm and, to a lesser extent, happiness, which are perceived as sufficient, standing at 0.36.

Six cases with plants inside the workspace were observed, perceived as few with an average of -1.1. Plants inside a home caused happiness and calm (see Figure 5), this is related to studies showing that indoor plants have been determined to provide psychological benefits (Bringslimark, Hartig and Patil, 2009). These parameters are correlated with creativity, averaging 0.01, falling within a neutral position.

2.2.2. Teleworking and satisfaction

People who had previously teleworked defined their house as a home: a place of safety and rest that provides them with greater concentration because they have fewer distractions.

Nine participants had previously worked from home, although only sporadically, with a perception of -0.54, which caused a simultaneous sensation of calm and happiness, and occasionally neutrality. General satisfaction with work tended to be high, perceived at 0.66, teleworking allows for task-based flexibility depending on one's mood, which directly affects productivity (see Figure 6).

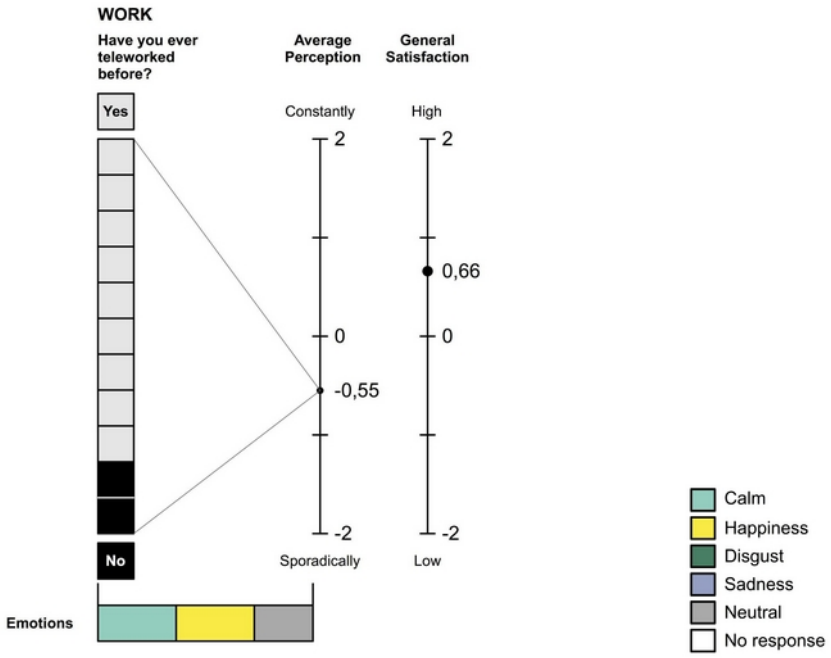

Figure 6. Teleworking and satisfaction.

2.2.3. Physical environment parameters over time

This study evaluated the following physical environment parameters from every domestic space –interior–: noise, the level of lighting on the work space, and the temperature. The evolution of the data over the seven days of the study is shown below (see Figure 7).

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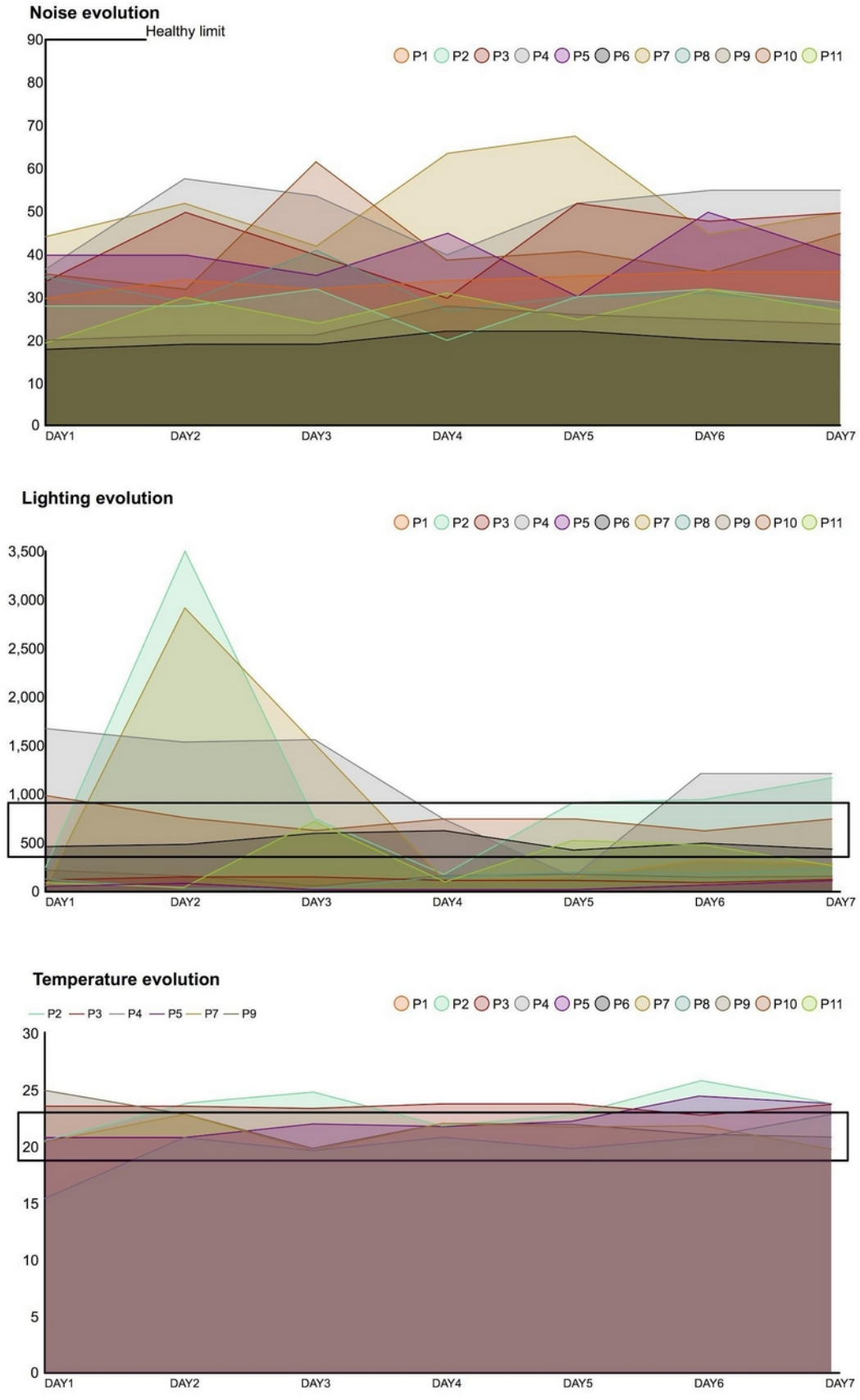

Figure 7. Noise –dB–, lighting –Lux–, and temperature –ºC– over time per participant in their domestic space.

The average for noise stood at 35.61 dB, with a minimum of 19.85 and a maximum of 52.28.The limit shown on the Figure 7 is 90 dB, based on OSHA criterion (OccupationalSafety and Health Administration , n.d.). Perception stood at -0.7, with a trend towards little, which caused a great deal of calm followed by a neutral state (see Figure 8). In general, noise limits

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usually address hearing protection, without considering data on sounds and well-being. Acoustic comfort is one of the most complex issues, as simply being below the established level is not sufficient: other factors such as frequency, vibrations, impacts, and the nature of the noise or sound have an influence (Lercher, 2019).

Regarding lighting, it had an average of 474.38 lux, with a minimum of 56.85 and a maximum of 1,146.14 lux. As seen in Figure 7, the comfort range is between 500 and 1000 lux (Lillo, 2000), as presented outlined in black, revealing that there are many cases that are below and many that are above what is recommended. Average perception tended towards a lot, at 0.42, and caused calm at 6.5, happiness at 3.5, and disgust at 1.

As to color temperature, all participants except one have warm artificial light for color temperature. Warm light mainly produces emotions of happiness and calm, although they also coexist with emotions of neutrality and disgust.

Only six participants had a tool to measure temperature, and the data provided varied between 16 °C and 26 °C with an average of 22.6 °C. Perception stood at 0.16 with a high tendency, and related emotions were calm and neutral, followed by happiness (see Figure 8). Thermal comfort is one of the most widely analyzed phenomena in terms of well-being associated with space (Chaudhuri et al., 2018; Huizenga et al., 2006). This study found no imbalances with this parameter, due to the seasons of the year in which it was carried out.

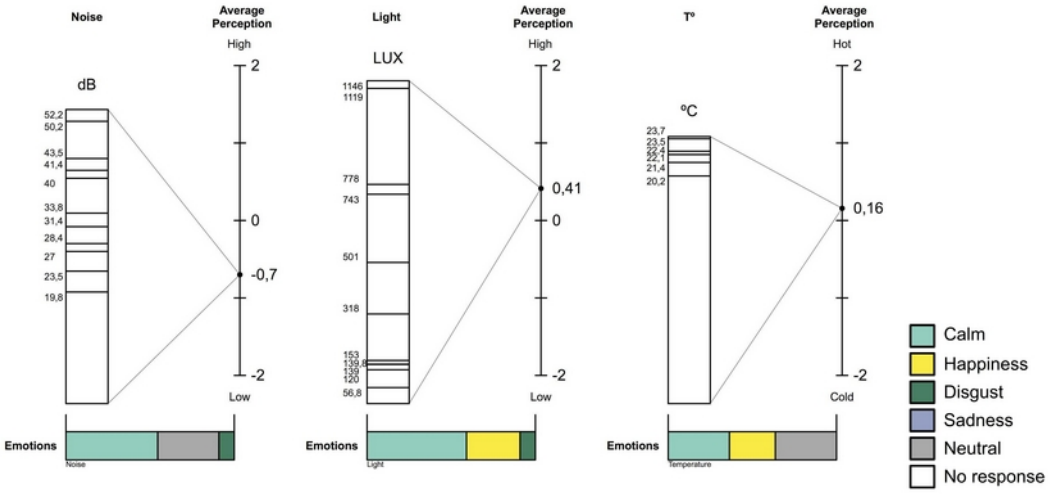

Figure 8. Noise –dB–, lighting –Lux–, and temperature –ºC– perception and emotion.

2.2.4. Noise and concentration

When relating noise and concentration, the correlation coefficient is -0.37, and we observed the following trend: at low noise levels, the level of concentration is higher (see Figure 9). In general, noise is always considered as a distractor and as a pollutant in communication.

2.2.5. Light and creativity

There is no correlation –the correlation coefficient is equal to 0– between the average lighting level, 474.3 lux, and the perception of creativity, -0.03 (see Figure 9). However, there are articles that do associate low lighting with greater creativity.

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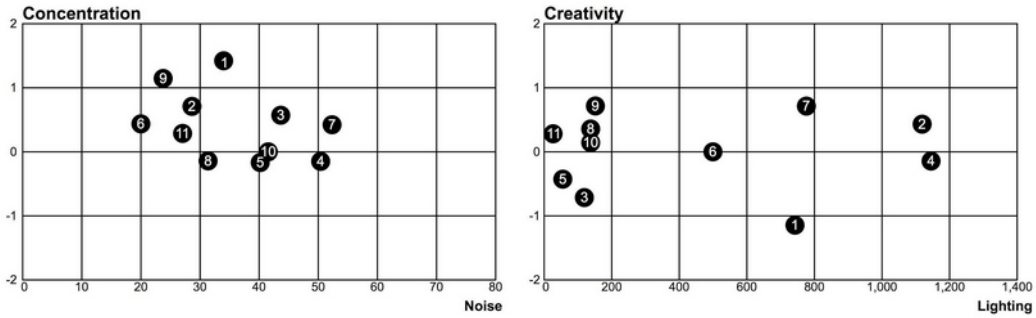

Figure 9. Scatterplot between noise –dB– and concentration; light –Lux– and creativity.

2.2.6. Activity in general

Individual activity trended towards high, with an average of 0.705, a maximum of 1.71, and a minimum of -0.28. It was rated as follows: 7 calm, 2 happiness, 1 disgust, and 1 neutral.

Social activity fell in a more in a neutral zone, with an average of 0.003, a maximum of 1.28, and a minimum of -0.71. In terms of values, this activity produced: 7 happiness, 3.33 neutral, 0.33 calm, and 0.33 disgust (see Figure 10). Social aspects are very important in the development of work activity. However, the confinement situation has caused, on one hand, that people achieve more calm in their individual tasks and on the other, value more those social moments -when these are in balance regarding the working day-.

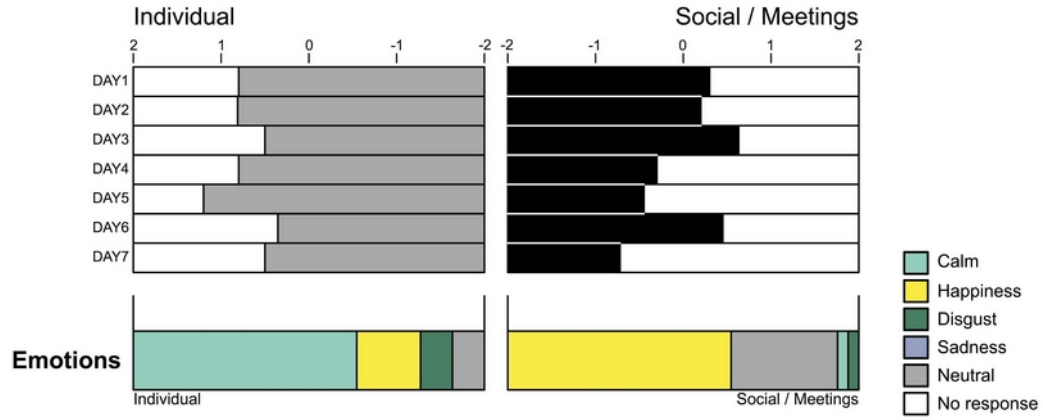

Figure 10. Individual and social activity and associated emotions.

2.2.7. Cognitive aspects

Productivity had a tendency towards high, with an average of 0.67, a minimum of 0.28, and a maximum of 1.28, associated with happiness, calm, and disgust. Creativity had a tendency towards low, with an average of -0.038 and extremes falling at a maximum of 0.71 and a minimum of -1.14, associated with calm, happiness, neutrality, and sadness. Concentration was observed with a high tendency at an average of 0.415, a minimum of -0.14, and a maximum of 1.42, associated with happiness, calm, neutrality, disgust, and sadness. Finally, general satisfaction had a tendency towards high, with an average of 0.622, a maximum of 1.71, and a minimum of 0.14, associated with happiness, calm, neutrality, and disgust (see Figure 11). This general satisfaction can be linked to an increase in both concentration and feeling productive, which is associated with states of calm and happiness, leaving the creative aspects and their more neutral emotional response on a more secondary level. This coincides with those previously stated regarding being in a familiar space where various parameters can be controlled by the user.

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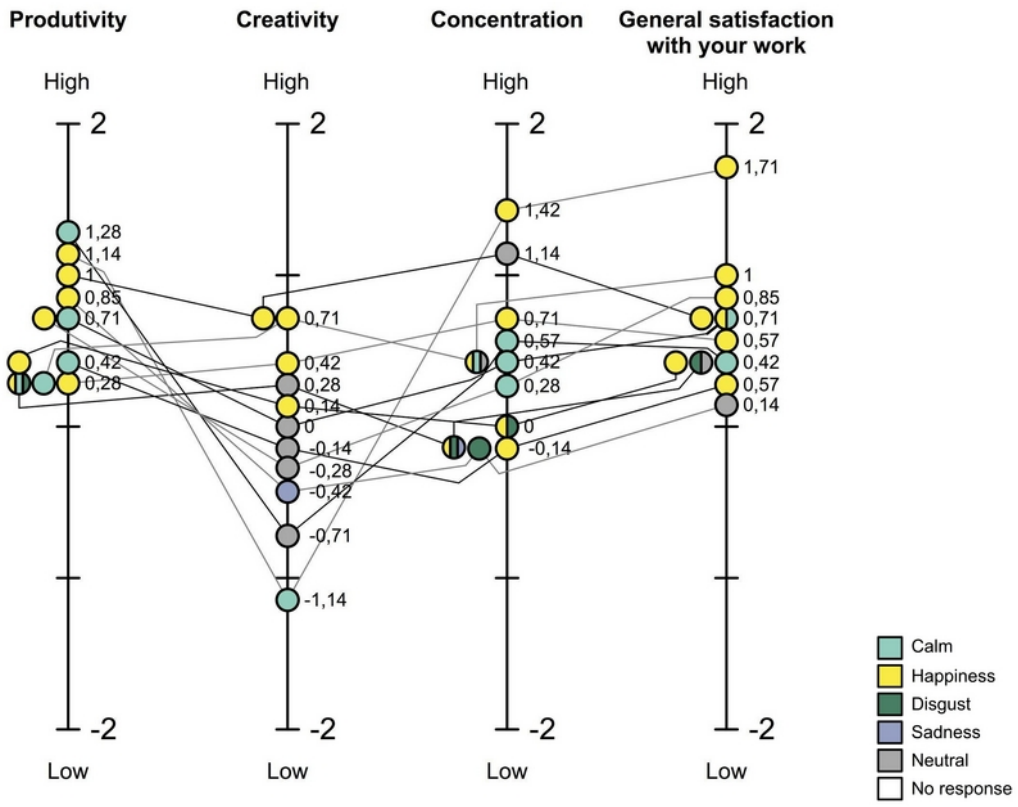

Figure 11. Productivity, creativity, concentration, and general satisfaction.

2.2.8. Environmental parameters of the territory

As to the environmental parameters of the territory monitored relating to temperature, relative humidity, and air quality, the evolution of the results over time can be seen below (see Figure 12).

As two measurements were taken for temperature, at the beginning and at the end of the day, the averages have been plotted. Both in Spain and Chile, the temperature remained between 14 °C and 25 °C. However, in the case of Stockholm, Sweden, a drop from 15 °C on the first day to 5 °C on the fifth day was observed.

Regarding relative humidity, greater variation was observed between locations, with Santiago and San Felipe, Chile and Stockholm, Sweden the most irregular. In both Chilean locations, the relative humidity exceeded the lower limit of the comfort range, between 30 and 40%.

Air quality was found to be a healthy constant in nearly all locations, except Santiago, Chile, which presents a visibly high value, reaching a CAQI (European Common Air Quality Index) figure above 80, bearing in mind that between 0 to 20 is very low, 20 to 60 low, 60 to 80 medium, 80 to 95 high, and 100 very high. The other locations were below 40.

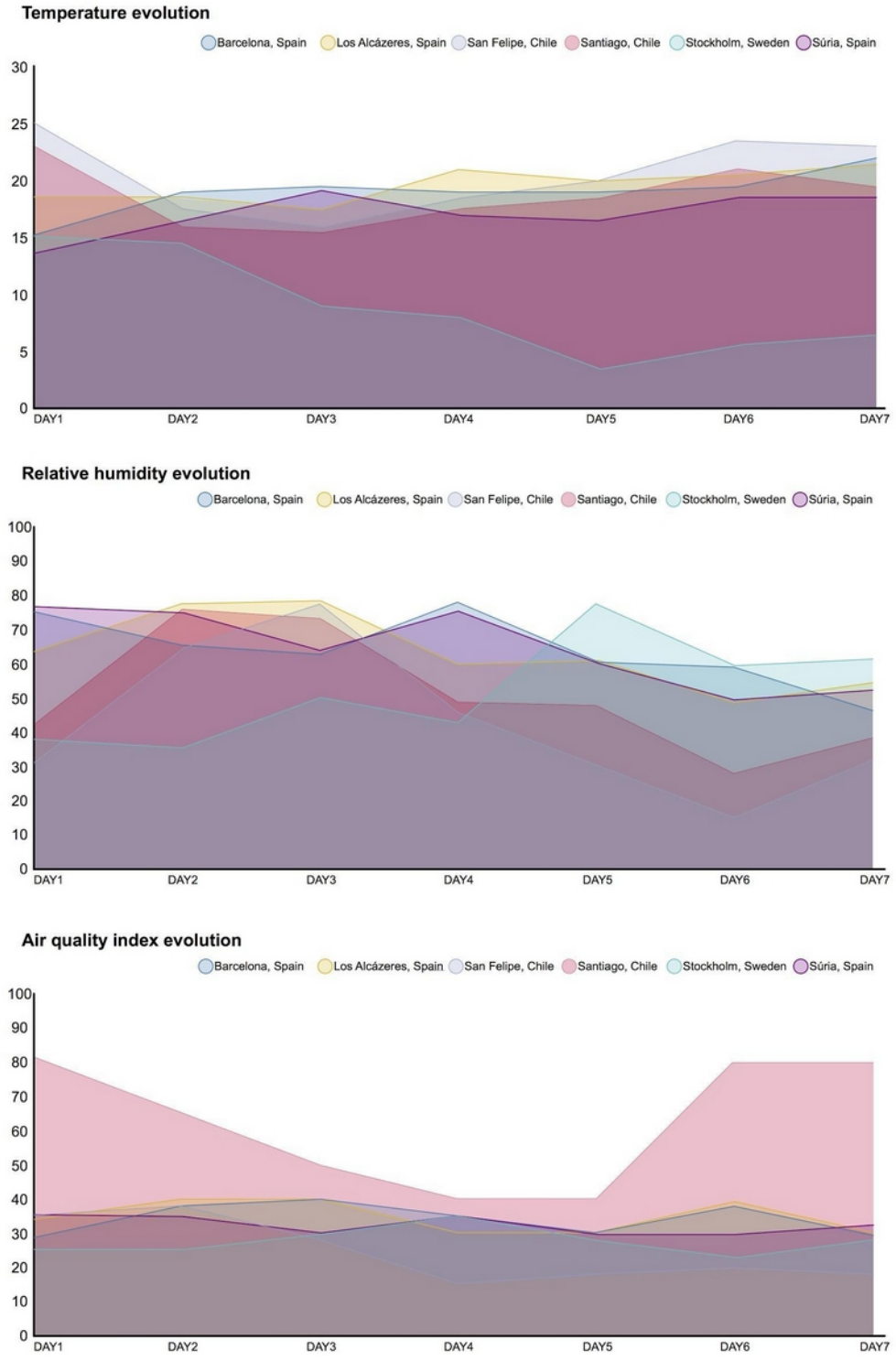

Figure 12. Location monitoring of temperature –dB–, relative humidity –%–, and air quality –CAQUI–.

3. DISCUSSION

3.1. Parameters, perception, and emotion

In this study, it is observed that in domestic environments, spaces are configured to the taste of the users and ergonomic aspects are not considered in a large majority of cases. On the other hand, the opposite occurs in workspaces, spaces are more neutral, less personalized, but more ergonomic.

Within these preferences, materials play an important role, apart from the scientific evidence (Zhang, J. et al., 2018; Kobetičová and Černý 2017), there are different platforms and design

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guidelines (Healthy Materials Lab, n.d.) to help professionals select materials that have healthy characteristics and promote well-being. These include: chemical components, textures, colors, among others (Friendly materials, n.d.; Mears et al., 2017).

For example, it has been proven that the use of wood in hospitals promotes faster recovery for patients and the psychological well-being of healthcare personnel. Moreover, there are types of wood that contain chemicals that help stabilize blood pressure and have an aroma that promotes restorative experiences (Matsubara and Kawai, 2014).

Although materials are one of the fundamental elements in the configuration of spaces, form and size also play an important role in perception and well-being. Symmetry, connectivity, and openness are involved in user experience, which has a direct impact on psychology (Ergan, Shi, and Yu, 2018). These more spaces of refuge, concentration, and intimacy should be one of the characteristics to be reinforced for the design of new workspaces –from large offices to collaborative coworking spaces– (Newsham, Veitch and Charles, 2008). Since they contribute to well-being and productivity, as seen in this study. In addition to materials and form, biophilia has become an increasingly used concept within spaces. Even though all participants' homes had a terrace or balcony, few had views of nature and almost half did not have indoor plants. In order to reinforce those healthy spaces, there are guides that help choose plants according to their benefits (Frély, 2013) and also guidelines for designers and architects on biophilic design patterns (Ryan, C. et al., 2014; Browning, Ryan and Clancy, 2014).

The same phenomenon happened with natural lighting. Apart from providing light, natural lighting ensures that people's bodies are in balance with the circadian cycle, which is how the body responds based on the time of day and the color temperature of the light (Stone 2009; Viola et al., 2008). Since proximity to windows is important in space design, it should be avoided settings that limit it, and strategies should be promoted to control unwanted effects such as glare/reflectance. Caution should be exercised, depending on the location and the orientation of windows, as an increase in direct sunlight can produce an increase in heat, and thermal discomfort. For the above, there are strategies (Khandelwal, Schenning and Debije, 2017; Shahzad et al., 2016), which help to control these effects. As can be seen in this paper, another important phenomenon is noise, and the noise data measured were always below the limit. However, there was a variety in terms of the perception of noise, what causes it, and how it affects, above all, concentration: on days with greater noise, lower concentration was observed. Acoustic comfort is one of the most complex issues, since it is difficult to control in different situations –both open/diaphanous workspaces as well as in the urban environment– which ends up affecting the domestic space and specific activities of concentration and virtual meetings.

Finally, air quality is a topic of great interest, especially in connection with the study of various diseases such as asthma, allergies, and even cancer and COVID-19. It is a more complex parameter to measure specifically, although there are various stations that allow us to understand the air quality of a given location, as evaluated in this study. However, these parameters are more of a regular feature than people understand, especially in a domestic environment that can be detected through HEPA's filters (Mousavi et al., 2020) and controlled by means of paint, the choice of objects, and maintaining the space free of toxic substances, although such information needs to be better disseminated (Healthy Materials Lab, n.d.).

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3.2. Heterotopia and other Covid-19 consequences

The COVID-19 pandemic has served as a driver for rethinking offices and promoting telework, as well as the role that these spaces will have following lockdowns (Julià, 2020). Architecture depends on lived social contexts (Till, 2009), and the current situation has brought the home office to stay (Global Workplace Analytics, 2015). Therefore, heterotopic spaces have been created (Foucault, 1967) that present advantages such as user empowerment, comfort, and better productivity, but at the same time, such spaces have points of tension that remain unaddressed (Trends Club by Cenfim, 2020). Porphyrios (1982) calls "heterotopic sensitivity" formal, considering the spatial organization that includes juxtaposition and the combination of different components and discontinuities in spatial composition, taking the works of Alvar Alto as an example in this approach and considering heterotopia "a category of design methodology."

In this study, see figure 4, different types of spaces have been observed – shared, comfortable, located based on natural light, and with technologically relevant elements that have been adapted at times to manage coexistence and simultaneous meetings. The colors they present –light and harsh tones, wood, orange, blue, black, and gray– have more life and are less neutral and aseptic compared to traditional offices.

The participants underscored the importance of natural light, temperature, noise, air quality, and view parameters as essential and relevant, confirming what science asserts, and all of these at home were more highly evaluated when compared to offices. In the other spaces – the Home Office– there is more natural light and exterior views in the various rooms, which encourages temporary settings and enables better alignment with the circadian rhythm. The temperature was more pleasant, as it could be regulated in a personal and non-centralized manner, and greater ventilation of the spaces was possible, which improved the perception of air quality. Regarding noise, spaces were shared in many home offices, and headphones were necessary for isolation within the context of confinement, as multiple and simultaneous video calls had to be dealt with.

Moreover, connectivity also led to greater stress and a loss of the sense of the work day and holidays. Recent publications coincide with the opinions of the participants, who stated an increase of two hours, or 38%, more work hours on average during confinement (el Economista, 2020). Another consequence of constant connection is the so-called Zoom Fatigue (Sklar, 2020). All of the foregoing has directly affected the work experience in recent months and has placed value upon the elements necessary to promote well-being in the workplace. Emotions influence experiences and subjective well-being, and are also a source for understanding people's use of spaces. We observed how domestic, personal, and family situations later have a direct impact on work, especially in such a complicated context. In addition, some of the participants mentioned the difficulty of choosing a group of emotions related to any of the parameters, evidencing the need to support emotional intelligence and encourage learning about it from an early age.

4. CONCLUSIONS

Under normal circumstances, people spend between 80 and 90% of their time in indoor spaces (Dematteè et al., 2018; Statistics, 2008). However, with the confinement measures currently in place, this figure has reached 100% in many locations, mainly within the domestic context.

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This study highlights how people are able to creatively adapt their environments to be comfortable while remaining productive. This adaptation is due to the subjectivity of well-being and comfort, which depends on each individual. This makes it necessary to deliver tools that empower and control their environment in a healthy and humanly sustainable way.

It is striking how the various participants perceived size as neutral, although the dimensions did present a significant difference. This shows that the participants placed more importance on the combination of other parameters such as natural light, temperature, noise, ventilation, and views as elements that improve their cognitive and emotional experiences.

An increasing number of everyday tools allow us to make measurements. Beyond being ways to obtain data, they have become an opportunity for users to juxtapose and combine the elements in their own spaces based on their well-being.

This research aims to open a data-driven path to contribute to the present-day search for the creation and adaptation of suitable workspaces to promote well-being and productivity in the new normal situation resulting from the COVID-19 pandemic.

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ENDNOTES

[1] https://weather.com/es-ES/

[2] https://www.meteoblue.com/es/tiempo/outdoorsports/airquality/

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