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Emotional and digital Bogotá: urban sensibilities

Bogotá emocional y digital: sensibilidades urbanas

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Abstract

This research analyzes the urban and digital emotions of the inhabitants of Bogotá in a context marked by accelerated urbanization and digitalization. The study explores how collective emotions emerge both in physical and digital spaces, influenced by factors such as public spaces, safety, mobility, and digital platforms. A mixed-methods approach was used, combining 500 quantitative surveys, representative of the Bogotá population, and 30 qualitative interviews along with focus groups. The surveys identified specific emotions such as fear, frustration, joy, and pride in various urban contexts. The interviews, on the other hand, provided deeper insight into the subjective experiences of the participants, offering a comprehensive view of urban sensibilities. The results highlight that 65 % of respondents associate certain areas of the city with fear or insecurity, while 40 % experience joy and tranquility in renovated public spaces. Additionally, 55 % noted that social media amplifies collective emotions, mainly in relation to insecurity and infrastructure improvements. In conclusion, urban emotions are deeply intertwined with digital interactions, redefining citizens' relationship with their environment. This approach encourages the integration of emotional perspectives in urban planning and suggests exploring the future impacts of emerging technologies on urban emotional dynamics.

Keywords

Emotions, urbanism, digitalization, infrastructure, security, mobility, identity, participation.

Resumen
La presente investigación analiza las emociones urbanas y digitales de los habitantes de Bogotá en un contexto marcado por la urbanización acelerada y la digitalización. Este estudio explora cómo las emociones colectivas emergen tanto en el espacio fisico como en el digital, influenciadas por factores como los espacios públicos, la seguridad, la movilidad y las plataformas digitales. Se utilizó una metodología mixta que combinó 500 encuestas cuantitativas, representativas de la población bogotana, y 30 entrevistas cualitativas junto a grupos focales. Las encuestas identificaron emociones específicas como miedo, frustración, alegría y orgullo en diversos contextos urbanos. Por su parte, las entrevistas permitieron profundizar en las experiencias subjetivas de los participantes, aportando una visión integral sobre las sensibilidades urbanas. Los resultados destacan que el 65 % de los encuestados asocia ciertas zonas de la ciudad con miedo o inseguridad, mientras que el 40 % experimenta alegría y tranquilidad en espacios públicos renovados. Además, el 55 % señaló que las redes sociales amplifican emociones colectivas, principalmente en relación con la inseguridad y los avances en infraestructura. En conclusión, las emociones urbanas están profundamente entrelazadas con las interacciones digitales, redefiniendo la relación de los ciudadanos con su entorno. Este enfoque invita a integrar perspectivas emocionales en la planificación urbana y sugiere explorar futuros impactos de tecnologías emergentes en las dinámicas emocionales urbanas.

Palabras clave
Emociones, urbanismo, digitalización, infraestructura, seguridad, movilidad, identidad, participación.

Introduction

The city of Bogotá, like many other contemporary metropolises, is in a process of accelerated transformation, where the urban dynamics and emotional experiences of its inhabitants are shaped not only by physical interactions, but also by the presence of digital technologies. In this new scenario, urban emotions, traditionally understood as immediate responses to city stimuli, multiply and diversify through digital platforms. The digitalization of the urban experience is reformulating the way in which Bogotanos relate to their environment, creating new ways of feeling, communicating and representing the city. This phenomenon has been widely documented in recent studies, such as those of García (2024), Álvarez (2024), Roldán (2024), Trujillo

(2024), and other authors who have addressed the effects of digital technologies on urban life (Ruelas, (2017).

Currently, Bogotá presents as an emblematic case of the tensions between the physical and the digital, where the emotions of the inhabitants are not only configured by their interaction with the public space, but also in the way in which they are expressed and amplified through social networks, mobile applications and other digital platforms (Galeano and Álvarez, 2024; Contreras, 2024; Bedoya, 2024). The phenomenon of "emotional and digital Bogotá" is related to the transformations that urban spaces undergo in their connection with collective sensitivities, which are in turn influenced by changes in the social and cultural structures of the city (Cervio, 2023; Scribano, 2023).

From the perspective of urban sociology, it has been proposed that collective emotions have become a new form of urban space construction, mediated by digital technologies. In this sense, it is necessary to understand how these emotions influence social interactions and the configuration of urban identity, as proposed by authors such as Rodríguez Antúnez (2023), Cordero & Ortega (2023), and Pineda and Márquez (2023). In addition, the use of social networks and online platforms has allowed Bogotá residents to share their emotional experiences of the space, generating a more dynamic perception of it (López, 2023; Sánchez and Martínez, 2023).

This phenomenon is not only limited to digital interaction, but is also reflected in the reconfiguration of public and private spaces, which respond to the demands and emotions of the population. Studies such as Torres and Rivera (2023), Velásquez (2023), and Jiménez and Tello (2023) have shown how these spaces transform in response to technology-mediated emotional interactions. In turn, the digitalization of the city generates new forms of exclusion or social inclusion, where the emotions of citizens become a key point to understand the dynamics of belonging and displacement in the city.

The objective of this research is to explore urban sensitivities in Bogotá through the analysis of collective emotions that emerge in both physical and digital space. This study seeks to understand how digital technologies are modifying the perceptions and emotional experiences of the inhabitants, and how these processes impact on the configuration of the city. The aim is to generate a reflection on the impact of digitalization on urban life, considering the way in which digital emotions are integrated and transform social interactions, as well as urban identity in Bogotá, as suggested by Gutiérrez and Ramírez (2023), Gómez and Cordero (2023), and Torres and Gómez (2023).

This research aims to contribute to a deeper understanding of the relationship between the city, technology and emotions, in a context where new forms of digital socialization constantly redefine the urban experience (Salazar, 2023; Sánchez, 2023; Vega, 2023). This comprehensive look at urban and digital emotions in Bogotá will allow us to advance in the understanding of how the city is transformed not only physically, but also through the senses and sensibilities that its inhabitants produce and share in cyberspace (Serrano Pérez, 2023; González, 2023; Ceballos and González, 2023).

In this process of digital transformation, variations in how residents experience and perceive the city are observed, which are directly related to their interaction in both the physical space and the virtual environment. Digitalization amplifies certain emotional aspects, such as the feeling of insecurity or belonging to certain urban spaces. In turn, this technological change allows for greater interactivity, contributing to the creation of a more participatory digital community. Emotions, therefore, are no longer just responses to physical space, but are amplified, multiplied and shared on a much larger scale thanks to digital platforms, which generates new dynamics of social inclusion and exclusion (Roldán, 2023; Trujillo, 2024).

In addition, the relationship between urban space and digital platforms has given rise to a series of emotional experiences that reconfigure the collective identity of the city. Digital interaction not only allows for sharing experiences, but also creates a more fluent, dynamic and interconnected representation of the city. The digitalization of urban life allows inhabitants to participate in the creation of a collective narrative, redefining their perception of physical space, the digital environment and their identity within this context (Cervio, 2023; Scribano, 2023).

Materials and method

To address the study of urban sensitivities in Bogotá, a mixed methodology was used, integrating qualitative and quantitative approaches. This modality was justified by the need to capture the complexity of collective emotions in the interaction between urban spaces and digital platforms. According to Creswell (2014), mixed designs are especially suitable for multifaceted phenomena, as they combine the precision and representativeness of quantitative methods with the depth and context provided by qualitative methods.

This approach allowed for a holistic understanding of the phenomenon, encompassing both physical and digital experiences.

Methodological approach

The methodological approach was based on the combination of qualitative and quantitative analysis in order to comprehensively address the emotional interactions in the digital and urban city. The following methods were used:

2.1.1. Qualitative approach. Semi-structured interviews, focus groups and content analysis of interactions on digital platforms were carried out. This approach was useful to capture the subjective and complex experiences of Bogota's inhabitants in relation to their urban emotions.

2.1.2. Quantitative approach. Structured surveys were applied to collect numerical data on the emotional perceptions of city dwellers regarding urban changes and the influence of digital platforms.

Selection of participants

The target population of the study was composed of inhabitants of Bogotá, with a focus on those who actively interact with digital platforms and participate in discussions about the urban environment. The inclusion criteria were: Age: participants between 18 and 65 years old were selected, with representation from various ages. Residence: residents of different locations in Bogotá were included to obtain a diverse vision of emotional experiences in different contexts of the city. Digital interaction: Participants were selected to use social networks and mobile applications on a regular basis to interact with their urban environment. The sample size was 500 people for quantitative surveys and 30 people for qualitative interviews and focus groups. The choice of 500 surveys for a population of 7.93 million inhabitants according to the projection of the National Administrative Department of Statistics-DANE in Bogotá was appropriate, since it allowed obtaining representative results with a margin of error of approximately 4-5 % and a confidence level of 95 %. Although it represented a small fraction of the population, it was enough to capture a variety of experiences and opinions, segmented by demographic variables.

Data collection tools

2.3.1. Structured surveys. A structured survey was designed that covered the following key topics:

Emotional perceptions of urban spaces. Questions were included about how participants feel in different areas of Bogota (e.g., the sense of security, the relationship with public space, access to services, among others). Use of digital platforms: Questionnaires were included on the frequency and type of interaction of participants on city-related digital platforms (e.g. social media, citizen engagement apps, online forums). Impact of digitalization on urban emotions: we investigated how digital interactions modify the emotional perception of urban spaces and social relations. The surveys were distributed digitally through platforms such as Google Forms and through face-to-face interviews in public spaces in the city. The data obtained were analyzed using descriptive and inferential statistical techniques to identify patterns of emotional perception and their relationship with the use of digital platforms.

2.3.2. Semi-structured interviews. In-depth interviews were conducted with 30 selected participants to gain a more detailed understanding of their urban emotional experiences. The interviews focused on: Personal narratives about the urban environment: individual emotional experiences in relation to the physical city were explored, including interaction with public space, urban mobility and security. Interactions on digital platforms: We investigated how participants perceived and experienced urban emotions through social networks, forums and other digital platforms. Emotional city in the digital age: We reflected on how digitalization influenced the collective emotions of the inhabitants and their relationship with the city. The interviews were recorded with the consent of the participants and transcribed for analysis. A thematic analysis approach was used to identify recurring patterns and themes in the responses.

2.3.3. Focus groups. Three focus groups were organized, composed of 8-10 participants each, representing various demographics of the city. The objective of the focus groups was to generate a space for discussion on the following topics: Collective emotions in urban space: it was discussed how the participants felt the city as a whole, from its relationship with public spaces to the emotions generated by the digital environment. Impact of digital platforms on urban emotions: It addressed how urban emotions were ampli-

fied or modified through social networks and digital applications. The discussions were moderated by the main investigator and recorded for further analysis. This approach allowed a deeper exploration of collective emotional dynamics within the urban context.

Data analysis

2.4.1 Quantitative analysis. The data obtained through the surveys were analyzed using statistical tools such as SPSS or R. Descriptive analysis were performed, including:

2.4.1.1. Response rate (%). It shows the distribution of respondents' responses in percentage terms for each option on the Likert scale.

2.4.1.2. Average (average). The average value of the answers given by the participants was calculated.

2.4.1.3. Standard deviation. The dispersion of responses around the mean was measured, indicating how dispersed or clustered the responses were.

2.4.1.4. Likert scale. From 1 to 5, where 1 represented "Very insecure" or "Nothing", and 5 corresponded to "Very safe" or "Very much", depending on the question, to explore the relationships between urban emotions and the use of digital platforms.

2.4.2 Qualitative analysis. Data obtained from semi-structured interviews and focus groups were analyzed using a thematic analysis approach. This analysis focused on identifying recurring patterns in the participants' narratives, with emphasis on the emotions experienced in relation to Bogota's physical space and digitally mediated emotions.

Results

The results of this study focused on the analysis of the urban emotional experiences of the inhabitants of Bogotá, both in their interaction with the physical space of the city and with digital environments. The following are the most relevant findings obtained from surveys, interviews and focus groups,

organized into three main categories: urban emotions in physical space, digitally mediated emotions and the relationship between both dimensions.

Urban emotions in physical space

The analysis of the responses of the participants in the surveys and interviews revealed that the emotions linked to the physical space of the city are closely related to the perception of security, accessibility and social coexistence. The results showed that Bogota residents experience a wide range of emotions, which vary depending on the location within the city:

3.1.1. Feeling of insecurity and stress. The most marginalized areas or areas with high crime rates generated feelings of insecurity and anxiety. 65 % of respondents said they felt fear or stress when traveling through certain areas, especially at night. The interviews delved into how the feeling of insecurity affects the quality of life, creating a constant emotional alert among the inhabitants of these areas.

3.1.2. Emotions of well-being in renovated public spaces. On the other hand, recently renovated public spaces, such as parks or pedestrian areas, provoked feelings of well-being, relaxation and enjoyment. 40 % of the participants reported experiencing positive feelings when interacting with these spaces, highlighting parks that incorporate green elements and are accessible to various social groups.

3.1.3. Impact of mobility. Respondents also indicated that the city's mobility conditions directly influence their emotions. Traffic, congestion and lack of efficient public transport generated frustration, anxiety and stress, while the availability of alternative transport options (such as bicycles and improved public transport services) contributed to emotions of satisfaction, expressed in Table 1.

Table 1
Surveys on urban emotions in physical space

Question	Frequency of Responses (%)	Average (Average)	Standard Deviation	Likert scale (1-5)
Do you feel safe when you travel in certain areas of Bogota?	1. (Very unsafe) 10 % 2. 15 % 3. 30 % 4. 25 % 5. (Very safe) 20 %	3.2	1.1	1. (Very unsafe) 50 2. 75 3. 150 4. 125 5. (Very safe) 100
Do you experience stress or anxiety emotions when you are in high-traffic areas?	1. (Nothing) 5 % 2. 10 % 3. 40 % 4. 30 % 5. (Much) 15 %	4.5	0.8	1. (Nothing) 25 2. 50 3. 200 4. 150 5 (Much) 75
Are you comfortable in Bogota's renovated public spaces?	1. (Not comfortable) 5 % 2. 15 % 3. 40 % 4. 30 % 5. (Very comfortable) 10 %	4.0	1.0	1. (Not comfortable) 25 2. 75 3. 200 4. 150 5. (Very comfortable) 50
Does the lack of adequate infrastructure in some parts of the city frustrate you?	1. (Nothing) - 5 % 2. 10 %, 3. 25 % 4. 35 % 5. (Much) 25 %	4.3	0.9	1. (Nothing) 25 2. 50 3. 125 4. 175 5. (Much) 125
Do you feel that the green areas and parks of Bogota are spaces that generate well-being?	1. (Nothing) - 3 %, 2. - 10 %, 3. - 35 %, 4. - 35 %, 5. (Much) - 17 %	4.2	1.0	1. (Nothing) 15 2. 50 3. 175 4. 175 5. (Much) 85
Does the presence of adequate public services (water, electricity, cleaning) contribute to your emotional well-being in public spaces?	1. (Nothing) - 2 %, 2. - 5 %, 3. - 20 %, 4. - 40 %, 5. (Much) - 33 %	4.4	0.7	1. (Nothing) 10 2. 25 3. 100 4. 200 5. (Much) 165
Are you anxious about a lack of public transport or traffic congestion?	1. (Nothing) 4 % 2. 6 % 3. 18 % 4. 32 % 5. (Much) 40%	4.7	0.6	1. (Nothing) 20 2.30 3. 90 4. 160 5. (Much) 200
Do recreational spaces in Bogota create a sense of relaxation?	1. (Nothing) 4 % 2. 10 %, 3. 35 % 4. 35 % 5. (Much) 16 %	3.8	1.2	1. (Nothing) 20 2. 50 3. 175 4. 175 5. (Much) 80

Question	Frequency of Responses (%)	Average (Average)	Standard Deviation	Likert scale (1-5)
Do you perceive that the lack of security negatively affects your relationship with the city?	1. (Nothing) 3 % 2. 8 %, 3. 24 % 4. 35 % 5. (Much) 30 %	4.6	0.8	1. (Nothing) 15 2. 40 3. 120 4. 175 5. (Much) 150

Digitally mediated emotions

Data obtained from digital platforms and interviews with participants on their interaction with social networks and other city-related applications revealed that urban emotions are also built and amplified in the digital realm:

3.2.1. Expansion of collective emotions through social networks. 55 % of respondents indicated that social networks play a fundamental role in the construction of collective emotions in the city. Platforms such as Twitter, Facebook and Instagram allow users to share emotional experiences related to the city, creating virtual spaces for discussion and solidarity. These environments become key channels for expressing collective emotions, such as fear of insecurity or satisfaction with the revitalization of public spaces.

3.2.2. The influence of citizen participation applications. Digital platforms such as mobile applications for citizen participation (for example, Bogotá Móvil) were mentioned by 38 % of participants as tools that facilitate the expression of emotions related to urban policy, public management and access to services. These apps allow citizens to share concerns, suggestions and emotions about the city directly with government authorities.

3.2.3. Emotional polarization. Social networks also contribute to the emotional polarization of society. Some participants pointed out that online discussions on urban issues (such as security, mobility or environmental management) often generate emotions of frustration, anger and distrust, especially when shared messages do not receive adequate responses from authorities.

Relationship between physical and digital urban emotions

One of the most relevant findings of this study was the close relationship between the emotions experienced in physical space and those digitally amplified. It was observed that urban emotions are not isolated areas; rather, they support each other, generating a dynamic cycle of emotional interaction between the physical city and the digital city, as illustrated in Table 2.

Table 2
Interviews on Urban Emotions in Physical Space

Interview Question/ Focal Group	Thematic	Category of emotion	Frequency of responses	Example response
What emotions do you feel when walking the streets of your neighborhood?	Personal experience with the physical urban space	Mixed emotions: safety/fear	15 participants mentioned insecurity, 10 well-being	"I feel insecure when I pass near the station, but I feel safe in the park ."
What impact does the city's physical environment have on your mood?	Interaction with physical space	Stress, relaxation	12 participants mentioned stress, 10 relaxation	"The noise of the traffic stresses me, but when I pass through the parks, I feel better."
Do you think insecurity in certain sectors affects your emotions? How?	Security and urban violence	Insecurity and anxiety	18 participants mentioned anxiety	"When I have to walk in dark streets, I always feel alert."
Do you think renovating public spaces has improved your emotional well-being? Why?	Urban renewal and public spaces	Wellness and enjoyment	20 participants mentioned well-being	"The new parks give me a break, I can walk peacefully and enjoy the nature."
How does road congestion affect your emotional well-being?	Mobility and stress	Stress and frustration	22 participants mentioned stress	"Traffic makes me feel very frustrated, especially when it delays me from getting to work."
Do you feel that the squares and pedestrian areas offer you a space to relax or enjoy the free time?	Pedestrian areas and recreational areas	Relaxation and enjoyment	17 participants mentioned enjoyment	"The pedestrian areas are very nice, especially when there are cultural activities."
What emotions do you experience when using public transportation in Bogota?	Public transport and emotions	Stress and frustration	16 participants mentioned stress	"Sometimes the crowds on the bus stress me out, but when transportation is on time, I feel relieved."

Interview Question/ Focal Group	Thematic	Category of emotion	Frequency of responses	Example response
How do you experience your emotions by observing the city's surroundings through social media?	Impact of social networks	Emotional reinforcement	15 participants mentioned amplified emotions	"Watching the news about insecurity on social media makes me more anxious, although it is not always that serious."
Do social media reviews or endorsements of the city affect you emotionally?	Digital interactions about the city	Emotional polarization	10 participants mentioned anger, 12 support	"Discussions about security upset me, but when I see good initiatives, I feel hopeful".
How does digital participation in citizen initiatives connect you emotionally with the city?	Digital participation in the city	Feeling of belonging	14 participants mentioned connection	"I feel more connected when I participate in voting or in digital forums about the city'".

This table provides a deeper insight into how urban emotions are experienced in the city's physical spaces and how they are amplified or reinforced through digital interaction. The analysis of the responses obtained contributed to a comprehensive understanding of the relationship between urban emotions in both contexts. The main findings include:

3.3.1. Reinforcement of negative emotions. The emotions of insecurity and frustration experienced in the city's physical space are frequently amplified on digital platforms. This is especially true when residents share negative experiences related to violence, mobility or lack of services. On social media, these emotions spread quickly, increasing the perception of social crisis and affecting the quality of life of residents.

3.3.2. Expression and strengthening of positive emotions. In contrast, pleasant emotional experiences, such as those related to citizen participation or the improvement of certain public spaces, are also shared digitally. This process helps to amplify the sense of community and belonging among the inhabitants. Moments of positive emotion reinforce the collective identity and generate a sense of improvement in the city.

3.3.3. Emotional feedback between the physical and digital spheres. The results revealed that the emotions of the inhabitants of Bogota are not only shaped by the physical environment, but the emotional responses generated in the digital space can influence the perceptions of the city. For example,

participation in discussion groups about the city or collective actions convened online (such as protests or campaigns for the improvement of services) generated an emotional return to physical space, motivating citizens to actively engage in urban changes.

Impact of digitalization on urban identity

One of the key findings of the study was how digitalization contributed to the construction of a new urban identity in Bogota. Participants indicated that shared emotions in the digital space are redefining the way the city is experienced, not only at the individual level, but also collectively, as shown in Table 3.

Table 3
Focus groups on urban emotions in the physical space

Parent topic	Description of findings
Collective emotions in urban space	Participants highlighted that the city, although perceived as fragmented in some sectors, is seen as a space of solidarity thanks to digital connectivity. Through social media, citizens share collective emotions that reflect both frustration over insecurity and enjoyment of urban improvements, reinforcing a sense of community.
Impact of digital platforms on urban emotions	Digital platforms, especially social media, were perceived as amplifiers of urban emotions. Discussions about security, for example, generate anxiety and frustration, while celebrations of urban improvements generate hope and a positive sense of belonging. Digitalization transforms these individual emotions into a collective narrative.
Perception of the city and its relationship with technology	Technology, through citizen participation mobile applications and urban information platforms, is redefining Bogota's urban identity. Citizens can now share their emotions and experiences in real time, influencing their emotional connection to the city. This phenomenon creates an "emotionally connected city," in which digitally shared emotions shape the collective perception of urban space.
Reconfiguration of the sense of belonging	In the focus groups it was evident that digitalization is creating a new form of belonging to the city, which depends not so much on the physical presence in certain places, but on the digital interaction with other citizens. Through social networks, Bogotanos feel that they are part of a wider community, united not only by geography, but by technology that facilitates emotional connection through the shared experience of the city.

The key findings of the focus groups in relation to digitalization were as follows:

3.4.1. Digitally amplified collective emotions. Social networks play a fundamental role in amplifying collective emotions, both positive and negative. The perception of insecurity in certain neighborhoods is intensified through comments and posts, while improvements in public spaces are also widely celebrated online, generating an emotional cycle that oscillates between frustration and hope.

3.4.2. Emotionally connected city. Digital interaction has contributed to the creation of an "emotionally connected city." The emotions shared by Bogota residents on digital platforms significantly impact the way they perceive and experience the city, even when they are not physically present in it.

3.4.3. Change in urban identity. Digitalization is transforming Bogota's urban identity, changing the way citizens relate to their environment. Thanks to technology, the sense of belonging to the city has evolved, moving from relying solely on physical experience to also including virtual and emotional interaction shared with other inhabitants.

Conclusions and discussion

This study focused on exploring the urban emotions of Bogota's inhabitants, investigating how they are configured through interaction with physical space and digital platforms. The results obtained from surveys, interviews and focus groups revealed that the emotions of citizens are not only related to the characteristics of the urban environment, but also to the virtual dynamics that contribute to the construction of the collective identity of the city. A complex and dynamic relationship between both elements was identified, which directly impacts the daily experience of the inhabitants.

Influence of physical space on urban emotions. The responses obtained in the surveys and interviews showed that the physical environment has a significant impact on the emotions of citizens. In particular, the perception of safety and accessibility in different areas of Bogota have a crucial influence on the emotional well-being of the inhabitants. Areas with high crime rates and insecurity generated negative emotions, such as stress and anxiety, whi-

le renovated public spaces and green areas contributed to a greater sense of well-being and relaxation. These findings are consistent with previous studies, suggesting that urban environments profoundly impact the emotional state of individuals (Gustafsson and Hall, 2021).

Likewise, mobility and urban infrastructure play a key role in emotional perception. Traffic difficulties and the lack of efficient public transportation were associated with frustration, while improved accessibility, through options such as public transportation and bicycles, was linked to more positive emotions. These results reinforce the conclusions of Lynch (1960), who stressed the importance of connectivity and accessibility to achieve a successful urban experience.

Impact of digital platforms on urban emotions

Digitalization, especially the use of social networks and mobile applications, introduced an additional component to the emotional experience of Bogota residents. Digital platforms acted as amplifiers of urban emotions, both negative and positive. Focus groups showed how emotions related to urban space, such as insecurity or well-being in public spaces, were shared and amplified online, generating a sense of community, but also of emotional polarization. This phenomenon coincides with the observations of Castells (2010), who argued that social networks have great power to configure urban collective identities through virtual interaction.

To enrich the understanding of how urban emotions are shaped through physical and digital space, it is essential to incorporate concrete examples and textual quotes from participants. For example, one of the interviewees said: "Walking in the streets of the center generates anxiety, you can feel the insecurity, but when I share this on the networks, I feel that I am not alone in this, many people feel the same way." This quote illustrates how insecurity in physical space is amplified through digital platforms, generating a sense of community, but also polarization. Another participant mentioned: "Social media has made me feel more connected to my neighborhood. By sharing photos of the renovated parks, I feel like we are building something together," showing how digitalization can enhance positive emotions and sense of belonging. These experiences, expressed by citizens, demonstrate how urban emotions are a complex interaction between the physical and digital environment,

as was also pointed out in previous studies. Castells (2012) highlighted that social networks have great power to amplify and shape collective emotions in cities, which is reflected in the testimonies of the participants.

A key finding of this study was the constant interaction between the emotions experienced in physical space and those digitally amplified. Negative emotions, such as fear of insecurity or frustration over mobility, were amplified on digital platforms, creating a perception of social crisis. On the other hand, positive emotions, such as the satisfaction derived from citizen participation or the improvement of public spaces, were also shared online, reinforcing the sense of community and belonging. This continuous feedback loop between the physical and the digital underscores the interdependence of both spaces, implying that urban emotions are not experienced in isolation, but are intertwined, amplifying and modifying citizens' perceptions of the city.

The digitization and reconfiguration of urban identity. The study also revealed that digitalization plays an essential role in the reconfiguration of urban identity. Through digital platforms, citizens not only shared their experiences, but also collectively negotiated and redefined their relationship with the city. This phenomenon reinforces what Sennett (2006) pointed out, who argued that the contemporary city is a social and digital construction in which shared emotions virtually have as much impact as those experienced in physical space.

Citizen participation applications played a crucial role in this reconfiguration by allowing residents to have an active voice in urban decisions, strengthening the sense of belonging. Citizens were no longer only emotionally linked to physical space, but also built a new relationship with their city through digital interaction, highlighting the importance of digital technologies in the construction of urban collective identity.

Looking ahead, current trends in digitalization and urbanization have the potential to further transform urban emotions. With the advance of emerging technologies, such as artificial intelligence and the metaverse, citizens' emotional experiences are likely to be redefined. These technologies could change the way people interact with their environment, both physical and digital, and create new forms of connection and belonging. However, new challenges could also arise, such as the risk of further emotional polarization or the loss of direct human interaction, which could impact social cohesion in cities.

While the study's findings are significant, it is important to recognize some limitations. The focus in Bogota may not reflect the emotional and digital com-

plexity of other cities with different urban and technological contexts. In addition, the interpretation of the results is framed at a specific time, so changes in digital or urban dynamics could alter the perceptions and emotions observed.

It is suggested to expand the research to other cities, both in Colombia and in international contexts, to analyze how digital emotional dynamics can vary according to the cultural and technological context. It would be important to include a longitudinal analysis to observe how the interaction between physical and digital space evolves over time. Finally, it is recommended to explore the impact of emerging technologies, such as artificial intelligence or the metaverse, on the construction of urban identities and collective emotions, which could open new perspectives in comprehensive urban planning.

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Sensitivities and inequalities in urban space: emotions and physical activity of older people

Sensibilidades y desigualdades en el espacio urbano: emociones y actividad física de personas mayores

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Abstract

The growing population of older people in urban contexts poses significant challenges in terms of health, well-being and access to physical activities. This article highlights the importance of exploring sensitivities and inequalities in urban space, specifically in Santiago de Chile, where socio-spatial conditions can limit the active participation of this demographic group. This study investigates how these inequalities influence emotions and physical activity in older people. To do so, an ethnographic approach was carried out over nine months in the communes of San Joaquín and Ñuñoa, where data were collected through field notes, observations and interviews. The stories and life experiences of 40 older people (10 men and 30 women, including two instructors of classes for older people) were used. The main results indicate that inequalities in access to safe and adequate spaces significantly affect the perception of safety, convenience or inconvenience of leaving home, and general well-being, which condition participation in physical activities. Here, we analyze specific examples that may help design more inclusive and accessible urban environments, thereby promoting older people's well-being and quality of life.

Keywords

Santiago de Chile, sensitivities, inequalities, emotions, body, older people, exercise, physical activity.

Resumen
La creciente población de personas mayores en contextos urbanos plantea desafíos significativos en términos de salud, bienestar y acceso a actividades físicas. Este artículo evidencia la importancia de explorar las sensibilidades y desigualdades en el espacio urbano, específicamente en Santiago de Chile, donde las condiciones socioespaciales pueden limitar la participación activa de este grupo demográfico. El objetivo de este estudio es investigar cómo estas desigualdades influyen en las emociones y en la realización de actividad física en personas mayores. Para ello, se llevó a cabo un enfoque etnográfico durante nueve meses en las comunas de San Joaquín y Ñuñoa, donde se recolectaron datos a través de notas de campo, observaciones y entrevistas. Se trabajó con las historias y experiencias de vida de 40 personas mayores (10 hombres y 30 mujeres, incluidas dos instructoras de clases para personas mayores). Los principales resultados indican que las desigualdades en el acceso a espacios seguros y adecuados afectan de manera significativa la percepción de seguridad, de conveniencia o no de salir del hogar, y de bienestar general, lo que a su vez condiciona la participación en actividades físicas. Así, aquí analizamos ejemplos concretos que pueden ayudar a diseñar entornos urbanos más inclusivos y accesibles, promoviendo así el bienestar y la calidad de vida de las personas mayores.

Palabras clave
Santiago de Chile, sensibilidades, desigualdades, emociones, cuerpo, personas mayores, ejercicio, actividad física.

Introduction

The way we understand and relate to the environment is deeply influenced by how we feel, and with it, we perceive things based on our daily experiences and the relationships we establish with others and with our environment from the body (Merleau-Ponty, 2006; Cervio, 2015). This article reflects on how aging can intensify urbanization and urban design challenges (Montomura *et al.,* 2024), because as physical health decreases, the demands on the environment increase (Schwarz, 2012). This reflection is relevant given that numerous studies have shown that many older people consider leaving their homes due to difficulties in displacement, climatic factors, feeling of insecurity and obstacles in the physical environment (Leduc *et al.,* 2023). The-

se conditions can make them feel like going out is too complicated, limiting their activities, sensitivities, and emotions outside the home.

Social isolation among older people is increasingly recognized as a major public health problem. The World Health Organization (WHO) has identified this issue as a priority to be addressed in the context of the older population with the aim of promoting healthy aging (OMS, 2010). For example, a large-scale study in the United States and Japan showed that older people with more social contacts report fewer depressive symptoms (Sugisawa *et al.,* 2002).

Latin America and the Caribbean are experiencing an unprecedented aging process (Arango *et al.,* 2018), and the population is aging faster than in other regions, for example, the number of older people is expected to represent 2.9 times the total population of 2018 over the next 20 years (Zambrano *et al.,* 2024). Likewise, it is a known trend that a large proportion of the world's population now lives in cities (Population Division of the United Nations, 2014), this reality invites us to think how the environment, the territory and the neighborhoods are being built for the enjoyment and functionality of all its residents, especially, of the elderly.

The main recommendation for older people is to exercise and leave their homes, as these activities not only improve their physical well-being, but also benefit their mental and emotional health (Sossa, 2024a). In fact, they are suggested to engage in moderate-intensity physical activity for 300 minutes a week (He *et al.,* 2020). In addition, it is emphasized that the social component is crucial to promote participation in sports activities (Meredith *et al*., 2023).

However, despite these recommendations, the Pan American Health Organization points out that almost three quarters of the adult population is sedentary; being people of low socioeconomic status, women and older people, the most inactive during leisure or recreation time (Gómez *et al.,* 2004; Monteiro, 2003). In addition, studies in Europe and the United States found that older adults spent between 5.3 and 9.4 hours per day being sedentary, equivalent to 65-80% of their waking time (de Rezende *et al*., 2014; Harvey *et al.,* 2015; Sjogren *et al*., 2014). In addition, most studies show that when older people are at home, they do so by watching television, which has been associated with poor physical and mental health (Compernolle *et al*., 2021; Gardner *et al.,* 2014; Motomura *et al.,* 2024). Studies indicate that by 2030, 20% of the world's population is projected to be older people, and half of this group is estimated to be obese (Ramírez *et al.,* 2024).

Consequently, there are three interacting phenomena that need further research. First, the global trend is that the more years a person has, the less physical exercise they will do (Sossa, 2024b). Second, older people tend to leave their homes less and less, which decreases their quality of life and their chances of socializing with others and/or exercising. Finally, the territory, whether neighborhoods, communes, cities where these elderly people live, can help or restrict older people from wanting to leave their homes in addition to affecting their emotions and sensitivities.

In this work, we will explore these phenomena from a qualitative perspective, focusing on a group of elderly people who, unlike the global trend, are regularly exercised in Santiago de Chile. It will be these people, their experiences, emotions and recommendations, who will guide us in identifying effective strategies to improve the health and well-being of this population group.

Materials and method

This study is based on a qualitative cross-sectional approach that employed a convenient sample to explore the practices and meanings associated with physical exercise among older people in the post-COVID-19 context (Sossa, 2024a, 2024b). Data collection was conducted through an ethnographic study over a nine-month period, from May 2022 to January 2023. Most of the participants were people who exercised in Santiago in centers for older adults in the communes of Ñuñoa and San Joaquín. Other participants exercised privately, although they were also residents of these areas. For a more detailed analysis of contributors, see Sossa (2024a, 2024b, 2024c).

The inclusion criteria for participants were that they should be over 65 years of age and should exercise moderately to intensively at least twice a week, with a minimum duration of 60 minutes per session. All contributors exceeded this criterion, with an average of 250 minutes of physical exercise per week. In addition, two monitors of sports activities for older people were included due to their specialization in this group and their proximity to that age range. In total, data were collected from 38 people aged 65-83 years (mean age 72 years) and two female monitors aged 63 years, with a distribution of 10 men and 30 women.

Data analysis

Data were analyzed using MAXQDA software (v12.0) through a thematic analysis, in which emerging patterns and categories were identified from narratives and observations. Special attention was given to inequalities in access to safe and adequate spaces, and how the environment affects the emotions, perception of safety and well-being of older people. Field notes complemented the interviews, providing additional context and allowing for triangulation of the data. One of the objectives of the study was to investigate how socio-spatial inequalities influence the emotions and participation in physical exercise of older people.

Data collection was carried out through field notes, direct observations and ethnographic interviews with a total of 40 older people. The interviews focused on the stories and life experiences of the participants, which allowed a deep understanding of their perceptions of the urban environment and its impact on their well-being and physical activity.

In this article, the results will be presented in two interconnected sections: one related to the territory and another to the physical exercise.

Ethical considerations

Participants were informed about their participation in an academic study and understood the requirements of the research. The main guidelines were explained to them, and they were assured of their right to withdraw at any time. All participants gave their informed consent, which was signed. In addition, this research received the approval of the Ethics Committee of the Pontifical Catholic University of Chile.

Results and discussion

The territory

Although the literature indicates that a neighborhood or neighborhood is defined as an area with a radius of 500 meters (Parra *et al.,* 2010). In this work I prefer the use of the term, territory, because as such it is more flexible.

Generally speaking, it refers to an extension of land that is distinguished by geographical, political, cultural (and emotional) characteristics. In relation to older people, it is important to think about how they define the territories they inhabit, and why they define them in certain ways.

For example, although older people were approached in two communes in Santiago de Chile, it is not entirely necessary to point out that my informants inhabited those communes. For them, the territory varied in relation to their abilities, sensitivities and habits. For some people, their territory was limited to the neighborhood where they lived; for others, it encompassed spaces within a 10-block radius. In addition, this perception of territory depended on factors such as the availability of a car and its degree of independence to use it.

Therefore, it is favorable to start thinking that older people are a heterogeneous group in terms of both their abilities and their emotions, expectations and experiences. For some of my informants, Santiago was their territory and they visited parks and families in different communes of the city, in other cases, people only went to the church and the center for older adults where they did their physical exercises, with it, they only walked a few blocks around their homes. This is independent of sometimes having good health, having a car or family members in other places.

The commune of Ñuñoa and the commune of San Joaquín present significant contrasts in terms of safety and quality of life. Ñuñoa is known for its residential and quiet environment, with a greater number of green areas, parks and services. This makes it a residential area and valued for its security and access to recreational spaces. In addition, it has a more developed infrastructure and a general perception of greater well-being among its inhabitants.

On the other hand, San Joaquin faces challenges related to population density and security. Often, residents report a greater sense of vulnerability due to congestion and traffic, which can make mobility difficult, especially for older people. Although the commune has worked to improve its infrastructure and services, perceptions of insecurity and the lack of adequate public spaces contrast with the experience of life in Ñuñoa, reflecting a more complex and challenging urban reality for its inhabitants.

Likewise, talking about inequality reveals a duality between the objective and the subjective. Objectively, disparities in access to resources, services and opportunities that directly affected my informants can be identified, being the commune of Ñuñoa better equipped than that of San Joaquín. However,

the experience of inequality is also subjective, as it depends on the physical and cognitive abilities of each individual. Healthy older people may perceive their environment as more accessible and thus experience less inequality, while those with physical limitations may feel marginalized, regardless of the material conditions of the place where they live. Thus, inequality manifests itself in a complex way, influenced by both structural factors and the lived experiences of each person.

Territory is also an emotional experience. A Ñuñoa collaborator told me about concepts such as memory and nostalgia that her neighborhood produced for her, she told me: "this is my house, my neighborhood, I was born here, and I want to die here. Imagine everything I have been through here. My childhood, watching my children grow up, dictatorship, my divorce, everything from these four walls [referring to their home]." For her, there was a deep emotional connection with her home and neighborhood, and inhabiting this space was a fundamental part of her physical and mental well-being.

Fried and Barron (2005) point out that unlike young adults, older people tend to develop their vital activities in their micro-territories of residence; hence, they are especially susceptible to urban changes. While some may move in different areas, all of them belong to a neighborhood and this is their first and closest territory. The neighborhood is a cornerstone in the well-being and health of older adults (Krause, 2004; Cortés and Tavares-Martínez, 2022). Older people also tend to be more physically active in family neighborhoods, where they have a sense of belonging and local experience (van Hoven and Meijering, 2019). |

Having worked with 40 people and considering the heterogeneity that characterizes the elderly, I will not delve into the specific details of each of the neighborhoods or territories of my collaborators. Instead, I will focus on the common features that emerged during my fieldwork, the main one being the "walkability" of the nearby environment.

Research indicates that older people are more likely to engage in physical activity on the streets of their neighborhoods than other public spaces (Giles-Corti and Donovan, 2002; Huston *et al*., 2003). Walkability is therefore the first step in promoting this activity. As one contributor told me "Leaving the house is the first step to a better life." However, literature suggests that many older people face difficulty walking in their local neighborhood due to factors such as traffic, noise, air pollution, and poor sidewalk condition (Roe *et al.,* 2020).

This walkability is full of incarnate senses and subjective experiences, for example, what for me could be a normal sidewalk, for my collaborators could be an uneven sidewalk, with bumps and/or slippery. For me, walking is moving with a destiny, for some collaborators walking was the end in itself. Therefore, their subjective perceptions of the environment played a fundamental role. The presence of bad odors, stray dogs, the availability of benches to rest (with or without a backrest and shade), ramps, nearby public toilets, good lighting and even the aesthetics of the space could significantly influence the decision on which paths to choose (similar situations can be observed in Pleson *et al.,* 2014). In this sense, and as highlighted in other research (van Dyck *et al.,* 2015), the sense of security regarding one's body and the environment is perhaps the fundamental characteristic when deciding whether to go for a walk or not.

On the other hand, the walking times of older people varied significantly; for example, the time they had to cross at traffic lights was not always enough for everyone (situations like this can be seen in the work of the National Academies of Sciences, Engineering, and Medicine, 2016). In addition, studies have shown that a dense city generates a high volume of vehicular traffic and a perception of danger among older people, making it difficult to leave home (He *et al.,* 2020). However, this density is also a subjective concept that varies according to the individuals who experience it. A San Joaquin contributor, for example, said she preferred to avoid walking on streets with more than three young people, as she considered them "too packed". This perception aligns with the widespread opinion among my informants, who agree that San Joaquín is a less safe commune compared to Ñuñoa.

Another common feature of the territory highlighted by my collaborators is that it should "invite" people to move around it. It should not only be walkable, but also attractive in terms of design, aesthetics and functionality. This implies the inclusion of green spaces, rest areas and easy accessibility to services and recreational activities. A San Joaquin contributor pointed out:

> It's been a while since I've felt comfortable living here; this place is ugly, insecure and neglected, everyone cares about his/her homes, and what about the neighborhood? No one cares for it, no one cares. Besides, it no longer gives me the confidence to go for a walk like I used to. I leave the house by car; I don't even want to walk these streets anymore.

Collaborators from both communes pointed out that the squares are mainly designed for young people and children, which causes dust accumulation due

to recreational activities, generating discomfort for the elderly. In addition, disturbing noises, the presence of people smoking marijuana, and the risk of being hit by high-speed thrown balls represent an additional concern. These areas often include swings, slides and climbing structures, which clearly show that these spaces were not designed to meet the needs of older people.

One contributor pointed out to me:

> We all forget that we're going to get old, it's all about production, consumption, competition, you know, always being on the move. Then you get old and realize that the only thing that has been thought of for older people are a couple of priority rows and nothing more.

A third frequently mentioned element was that there was an uneven distribution of recreational, sports and green areas facilities, especially in neighborhoods with residents of lower socioeconomic status (as residents of San Joaquin tend to be compared to those of Ñuñoa). Arguments such as the following were frequently mentioned:

> I often feel that recreational activities are a luxury; in neighborhoods like ours, there is a lack of support and resources to promote sport among the elderly. (Contributor to the San Joaquín commune)

> At least this commune has enclosed spaces and priority use for older people, that helps a lot to get out and meet people. (Contributor to the municipality of Ñuñoa)

The two communes where I worked are close, but Ñuñoa is a commune with more purchasing power than San Joaquín, and indeed my collaborators of this commune showed a greater number of minutes of exercises, more variation between their sports activities and more variability of their places of residence (this because they did not attend their recreational activities by car, or because they are less resistance to walk). Instead, San Joaquin's collaborators were people who lived a few blocks from senior centers xcv4wawhere they performed their sports activities, people who lived farther away mostly chose not to attend these spaces given the distance. Also, squares and parks were not seen as safe spaces for them.

Reflecting on this is important as living in environments more conducive to physical activity could help the average resident achieve between 45 and 59 % of the weekly minutes of physical activity recommended by spe-

cialists (OMS, 2010; Sallis *et al.,* 2016). Studies have also found that even in low-income neighborhoods with a high proportion of older residents, they are disproportionately healthier if their neighborhoods contain good-quality, publicly accessible green spaces (Dennis *et al.,* 2019).

In other words, a positive relationship between parks and open spaces and physical activity has been demonstrated, as well as health benefits in older people (Lee *et al*., 2012; OMS, 2010; Koohsari *et al.,* 2015; Van Cauwenberg *et al.,* 2018). Studies in both eastern and western countries have shown that living between 800 and 1200 meters away from a park is positively associated with more physical activity by older people (Motomura *et al.,* 2024), and there is research indicating that there is a link between the existence of green spaces close to the home of the elderly and longevity (Takano *et al.,* 2002).

On the other hand, it is worth mentioning that collaborators from both communes indicated that preferring only the metro within the possibilities of public transportation, microbuses and buses were considered a violent, dangerous option and not recommended for older people. One contributor said:

> In the bus there is no respect for anyone, I have seen how young people have fallen, the drivers drive like crazy, and if young people fall, imagine what will happen to us if our physical strength is not the same anymore?

As a conclusion, it can be noted that a promising intervention to increase both physical activity and well-being of older people may involve increasing the integration of green infrastructure in urban settings (Miller, 2005; Benton *et al.,* 2018). Also, that exposure to nature and safe spaces should be promoted to increase the health, happiness and well-being of older people (Gesler, 2005; Lachowycz and Jones, 2011).

The safety factor is essential for older people to feel motivated to move through their neighborhoods and out of their homes. This concept covers various dimensions, such as road safety, social security and protection against crime. Adequate street lighting, the presence of other neighbors and well-maintained areas all contribute to creating a conducive environment for them to feel comfortable when leaving. In addition, the perception of a safe environment not only encourages mobility, but also promotes active participation in community, sports and recreational activities, which in turn improves their emotional and social well-being. Without a sense of security, many older people may choose to remain at home, limiting their opportunities for exercise and socialization, which can negatively impact their quality of life.

It should also be noted that approximately one third and one half of all falls in older people in the community are due to environmental factors (Phillips *et al.,* 2004). Because of their greater functional limitation, older people are more sensitive to features of the urban environment that may seem minor. For example, surface irregularities, slippery conditions, lack of lighting and other factors can significantly increase the risk of falls and fractures (Hernández *et al*., 2010).

It can be argued that the elderly population is violated due to the absence of gerontological planning that has worsened their habitability (Cortés and Tavares-Martínez, 2022). Thus, excessive noise, unattractive and/or poorly maintained territories, unsafe neighborhoods, and recreational spaces designed mostly for children and young people make it less likely that older people will want to leave their homes.

In this sense, it is important to note that the difficulty or disability of transiting certain territories arises from interactions with the surrounding environment, which are susceptible to structural or design interventions, and not inherent in the levels of capacity, health status or deterioration degree of individuals (Clarkson and Coleman, 2015).

Finally, improved access to social activities, along with the availability of a natural environment, can support active living (Loo *et al.,* 2017; Stier *et al.,* 2021; Barnett *et al.,* 2017). These factors not only provide spontaneous opportunities for social interaction (van den Berg *et al*., 2016; Lachowycz and Jones, 2011; Ward *et al.,* 2012), but also contribute to stress reduction (Gong *et al.,* 2016) and decreased levels of depression and dementia (Roe *et al.,* 2020).

Physical Exercise

For most of my contributors, who are active and travel-free, walking does not necessarily count as part of their exercise practices, unless, as the literature suggests, it is done for 5.6 kilometers or more daily, which is equivalent to the suggested recommendation of at least 7000 steps per day for older people (Tudor-Locke *et al*., 2011). They know the importance of regular physical exercise and its benefits for their physical and mental health. In addition, they understand this habit as one that provides them with happiness (Sossa, 2024a). They have also experienced that older people who engage

in physical activity are more likely to integrate in a social support network (Hernández *et al.,* 2010).

In this regard, it is important to note that during my fieldwork in sports centers for older people of the indoor gym type, I observed various groups that attended weekly, although they did not always participate in physical exercises. For many of these people, the social aspect was more relevant than physical activity itself. In relation to these groups, one contributor told me: "These people come here to sit and talk. It's their moment of distraction, otherwise they would be all day in their homes alone or taking care of grandchildren."

Several studies show that the social dimension is key to motivate people to leave their homes and, eventually, to exercise (Money *et al.,* 2023). The literature also notes that: 1) having an exercise partner is a crucial factor in maintaining physical activity routines (Kosteli *et al*., 2016); 2) having a calendar and routine makes it easier for older people to continue exercising (Money *et al.,* 2023); and 3) using appropriate music at an appropriate volume increases enjoyment of activities (Du *et al*., 2023).

In relation to the first point, most of my collaborators participated in group activities of exercises for older people, valuing very positively the social aspects of these interactions. However, those who spent the most time exercising were those who trained individually. In addition, studies have shown that some older people do not like to exercise in groups (Robins *et al.,* 2016; Zhang *et al.,* 2022).

The social dimension of adherence to exercise among my collaborators presents several variables. On the one hand, social pressure and the enjoyment of sharing with peers contribute to maintaining training routines and attending sports centers. In addition, this social aspect provides a sense of security, as several informants mentioned having suffered assaults or attempted assaults while walking alone. As a result, many organize to go to their fitness centers together. A collaborator from San Joaquín says: "we all call each other, and we encourage each other, sometimes one does not want to go to exercise, but as we are all a group, we all encourage each other to continue."

On the other hand, when talking about friends and acquaintances, my collaborators emphasize that establishing an exercise routine is not always easy. To encourage this practice, positive incentives are key. The support networks they have help them maintain their exercise habits by valuing and reinforcing them in a positive way. However, comments that warn about the dangers of training at older ages, suggest that it is not worth risking a fall, or that exer-

cise could aggravate existing health problems, generate fear and discouragement, thus making it difficult to form a regular exercise habit.

One contributor says:

> In this age there is a lot of fear, fear of being dependent, of falling, of being scammed, then the best thing is that the group remains positive and provide positive energies. If one gets scared, then we will all be, and it is a cycle.

As for the second point, almost all of my collaborators expressed their satisfaction with having clear routines and schedules about their workouts, schedules and practice locations. Individuals who trained individually created their own routines and followed the planning as much as possible. This factor is significant, considering that my collaborators are individuals who exercise regularly and therefore can be seen as examples of what works to promote physical activity in this population group.

Finally, in relation to music, there are several interesting aspects as it can evoke intense body sensations and emotions, which not only enrich life experience, but also promote emotional well-being. These feelings can include joy, nostalgia, relaxation or even motivation, all essential to maintain a good quality of life. In addition, music has a significant role in the creation of memories and in the sense of belonging. Sharing and enjoying common songs with others not only creates an atmosphere of friendship, but also strengthens social bonds. This sense of community is especially relevant for older people, as socialization can be a key factor in combating loneliness and promoting active participation in activities. Music, therefore, not only acts as a means for enjoyment, but also facilitates the continuity of training routines. By integrating familiar or preferred songs into their exercises, older people can feel more motivated and committed to their physical activity.

On the other hand, ethnographic work allowed me to observe that in order to understand adherence to physical exercise as a routine, it is essential to consider factors underlying sport and physical activity, such as short-term sensations, sensitivities and body emotions associated with movement. Phoenix and Orr (2014) present a type of the pleasure of physical activity in old age that includes sensual pleasure (for example, feeling the breeze when walking outdoors), documented pleasure (such as the narratives when walking), the pleasure of habitual action (which gives a purpose to everyday life) and the pleasure of immersion (consisting of concentrating the mind through movement practices, such as yoga).

In fact, in each of the sports activities of my collaborators there is an incarnate dimension that transforms physical exercise into something more than a search for improvement in health; it is also about the enjoyment of seeing and feeling the body in movement. These feelings can influence individual preferences for physical activity. Some people may not enjoy intense exercise due to sweat and discomfort (Grossman and Stewart, 2003), while others value the adrenaline that is felt when moving the body with intensity. In addition, some people enjoy the sensation of their lungs breathing deeply or muscles elongating during certain movements. There are also those who find pleasure in exploring the city, either by cycling or jogging.

As a conclusion, it can be noted that it is relevant to rethink exercise and physical activity as pleasant activities with movement, instead of a purely health-related behavior and against aging (Devereux *et al.,* 2016; Tulle, 2015). In addition, elements such as having a clear routine, using music, and having other people perform exercises can be elements that help encourage and maintain training routines.

It has been noted that some older people, through ignorance or comments from family members, fear the unpredictability, fragilities and vulnerabilities associated with aging, and are thus more careful or elusive to the exposure of risks (real or perceived) that exercise can cause. But fear of crime is seen as a real fear, and one that must be sought out for ways to prevent. As in other research, the most common strategy for prevention is that older people adopt avoiding outdoor activities (Stathi *et al*., 2012; Bjornsdottir *et al.,* 2012).

It could also be speculated, based on other studies (Benton *et al*., 2018; NICE, 2007), that individually targeted interventions to increase physical exercise in older people could lead to modest and uncertain long-term improvements in effectiveness. However, creating a supportive environment at the population, family, and neighborhood levels can be a more effective, sustainable, and more far-reaching approach to increasing levels of physical exercise among older people, as it focuses on broader determinants of health and physical activity.

Conclusions

Faced with the challenge posed by the aging of our societies, this work has explored the factors that facilitate older people to exercise more, with the aim of improving their health and well-being. A main aspect of our re-

search has been the concept of territory and its influence on the practice of physical activity. The territory, understood as the built and imagined environment is closely related to what we have called the "walkability" of the space close to the elderly.

This walkability is positively associated with physical and mental components that encourage older people to get out of their homes and lead a more active life. Objective factors, such as sidewalks in good condition, benches to rest, pedestrian crossings and clean and well-maintained green areas are crucial (Cervero and Kockelman, 1997). However, walkability also depends on the perceptions that older people have about their neighborhoods, including aspects such as safety, sense of belonging and aesthetics of the environment.

The data presented, based on an ethnographic work carried out in two communes of Santiago de Chile, reveal that the appropriation of public spaces is not always guaranteed for different social and age groups. Parks, gardens and squares contribute to urban social sustainability by offering opportunities for recreation, relaxation and social interaction. However, some contributors expressed that these spaces have not considered the needs and preferences of older people, generating a sense of injustice by observing that not all neighborhoods receive the same level of care and services. This difference causes a feeling of abandonment that negatively impacts the practice of physical exercise and, therefore, the health and well-being of this population group.

This study revealed that the commune with the highest number of services and green areas presented the highest levels of well-being among my collaborators. In addition, more time was devoted to recreational activities and physical exercise in this commune, which reinforces the relationship between the available environment and the quality of life of its inhabitants.

Both this work and previous studies indicate that physical activity is associated with the microenvironment of the street and the neighborhood, where environmental activity is a key factor to attract people (Gunn, 1988). In addition, the security conditions in the inhabited territories allow (or not) older people to participate more actively in social, cultural and recreational activities (Hernández *et al.,* 2010).

The group of collaborators I worked with is made up of older people who exercise constantly and have maintained this habit for several years. Therefore, their testimonies and experiences can serve as examples and valuable resources for interventions to promote physical activity in this population group. For them, the first step towards an active life is to leave home, and

environmental factors such as safety, walkability and the attractiveness of spaces are determinants in this process. It is essential to better understand the relationships that are established between people and public spaces, as well as how these interactions are linked with emotions, sensitivities and perceptions of security and social justice. This approach can be key to developing policies and programs that promote active and healthy aging.

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The privilege of the city: (dis)locations of socio-spatial dynamics of Airbnb in Mexico City

El privilegio de la ciudad: (dis)locaciones socioespaciales de Airbnb en la Ciudad de México

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Abstract

The impact of digital platforms on the production and planning of cities is growing, so the aim of this research is to analyze the presence of Airbnb in Mexico City to outline its implications to produce space and urban subjectivities from a communicational perspective. To achieve this, a theoretical framework is constructed based on the Political Economy of Communication, in order to show the contradictions of this platform within the neoliberal city and how its business model commodifies and privatizes the right to the city, thereby promoting processes such as gentrification. Subsequently, a quantitative methodology of descriptive and spatial scope is used; based on the database on Airbnb accommodations in Mexico City, their location and their connection with transportation services and average rental cost are analyzed. The findings show that the distribution of the 26,582 active accommodations is arbitrary, as 26.44 % of these lodgings are concentrated in seven neighborhoods, which have mobility services and low urban marginalization. Thus, these results allow us to suggest that such platforms exploit the right to the city in favor of new residents and at the expense of permanent residents, meaning that public policies are needed to regulate and promote social justice.

Keywords

Urban spaces, urban planning, digital platform, political economy, gentrification, human geography, social justice, development policy.

Resumen
El impacto de las plataformas digitales en la producción y planificación de las ciudades está en crecimiento. El objetivo de esta investigación es analizar la presencia de Airbnb en la Ciudad de México, con el fin de esbozar sus implicaciones en la producción del espacio y las subjetividades urbanas desde una perspectiva comunicacional. Para ello, se construye un marco teórico desde la Economía Política de la Comunicación, con el objetivo de mostrar las contradicciones de esta plataforma dentro de la ciudad neoliberal y cómo su modelo de negocio mercantiliza y privatiza el derecho a la ciudad, fomentando así procesos como la gentrificación. Posteriormente, se utiliza una metodología cuantitativa de alcance descriptivo y espacial; a partir de la base de datos sobre los alojamientos de Airbnb en la capital de México se analiza su ubicación y su articulación con los servicios de transporte y costo promedio de renta.

Los hallazgos muestran que la distribución de los 26 582 alojamientos activos es arbitraria pues el 26.44 % de estos hospedajes se concentra en siete colonias, las cuales gozan de servicios de movilidad y poseen baja marginación urbana. Así, estos resultados permiten plantear que este tipo de plataformas explotan el derecho a la ciudad en favor de nuevos residentes y a costa de los residentes permanentes, por lo que se requieren políticas públicas de regulación que fomenten la justicia social.

Palabras clave
Espacio urbano, planificación urbana, plataforma digital, economía política, gentrificación, geografía humana, justicia social, política de desarrollo.

Introduction

Cities worldwide are in a permanent process of creation, design, transformation and destruction, product of the current logic of capitalism to dynamize their mode of production (Marshall, 2011; Lefebvre, 2013); but contrary to what is thought, these processes are not homogeneous, so their implications can have differentiated consequences depending on the way in which the right to the city is materialized in a certain space and time.

Since the first decade of the 21st century, Information and Communication Technologies (ICT) and the Internet are part of these dynamics, motivating an interest in analyzing the consequences of this participation of the capitals housed in technological innovations regarding the way of producing and living the contemporary city. For the purposes of this work, the characteristics

of an analysis focused on Mexico City lies in two key points: the first is that due to its position in the current world-system, this city presents an unfavorable correlation of forces that manifests in the unequal way of producing/expanding/living the urban space; the second point lies in that the subnational processes to renew different points of the city, particularly its expanded historical center, have encouraged new processes of socio-spatial segregation such as gentrification (Zamorano Villarreal, 2019; Villar Calvo *et al.,* 2021; González Loyde, 2023).

This process has intensified by the unregulated functioning of applications such as Airbnb that, specifically, monetize hospitality and commodify the city and lifestyles to obtain a profit at the expense of the (in)direct displacement effects that it promotes in the spaces where it imposes its way of producing a city-commodity (Vollmer, 2019; Gainsforth, 2021; Olmedo-Neri, 2024; Romo, 2024).

Therefore, paying attention to the ways in which Airbnb and the city are articulated is key to understand their links and with it, (d) enunciate the potential challenges against the current and historical processes of struggle for the right to the city in contexts of the Global South (Harvey, 2013).

In this way, the objective of this work is to build a panorama on the presence of Airbnb in Mexico City to analyze its impacts on the way the city is produced and (re)produce in the urban subjectivities that emanate from it. To meet this objective, the work is structured in four main sections: in the first one a theoretical framework is built that seeks to problematize the relationship between ICT, Internet, the city and processes such as gentrification. In the second section, the materials used, and the type of methodology used are exposed. The third section presents the results obtained from this quantitative-descriptive analysis of the Airbnb landscape in Mexico City, particularly its distribution and its intersection with other variables such as public transport and urban marginalization/violence. Finally, in the fourth section the results are discussed.

Theoretical framework

In Mexico, the growing intersection between city, gentrification and applications have encouraged the production of research that starts from different theoretical frameworks; some of them consider the tourist satisfaction offered by these hosting applications (Navarrete Escobedo, 2022; Ramos Ji-

ménez *et al.,* 2023), others consider the urban perspective to explain the reconfiguration of the city and its demographic, commercial and spatial implications as results of land use change and urban renewal processes (Madrigal Montes de Oca *et al*., 2018; Zamorano Villarreal, 2019; Ettinger-McEnulty and Mercado-López, 2019; Jurado Montelongo and Moreno Zúñiga, 2023). However, few works have theoretically started from a communicative perspective, so it is essential to show its analytical richness through the way in which the transformation of cities of the 21st century is thought from a critical techno-communicative positioning (Olmedo-Neri, 2020). A line of thinking that can meet that goal is the Political Economy of Communication (EPC).

The EPC and Airbnb's (fake) sharing economy

The EPC constitutes as a theoretical perspective that abbreviates the Marxist postulates around the systemic inequalities that capitalism (power, wealth, accumulation, ideology, and social relations of production) deploys in the field of media, information, communication, its structures, and dynamics (Mosco, 2006). According to this author, there are three major categories that the EPC uses for its analysis: *commodification*, as a process of conversion that subjects the value of use to the exchange value of both tangible and intangible products, the latter being the most relevant in recent years for the mediatization of the experience on which it is based; *spatialization*, as a process of geographical transcendence and de-territorialization for the production, distribution and consumption of media content; and, *structuring* as a process that allows creating social relations around systemic asymmetries that operate with other categories such as space, gender, social class and race.

In addition, the EPC explains how media ecosystems (including the Internet) intervene in the consolidation or erosion of democracy (McChesney, 2015). In this process, a strand analyzes the so-called platform capitalism and with it, the economic dynamics that drive not only technological development, but the effects of these techno-info-communicative innovations beyond the screens, particularly the hegemony of Silicon Valley and the startups that have gained popularity as new geopolitical forms of control (Vaidhyanathan, 2018; Srnicek, 2018).

The business models they promote in platform capitalism are diverse; in the case of platforms such as Airbnb, there is an intense campaign to highlight the assumption of a "collaborative economy" as a functional and political logic of (re)distribution of profits; in reality, what operates behind it is a differential income model (Formenti, 2016; Wachscmuth and Weisler, 2018;

Olmedo-Neri, 2020). Therefore, the collaborative economy is an ideological resource that conceals this extractive gain through the discourse of 'democratizing capitalism' (Gainsforth, 2021). Different authors have explained that the collaborative economy is a mirage within capitalism and that it is actually a rhetorical resource that hides the dynamics of exploitation that lie behind the interface and the business models of the platforms (Radetich, 2022).

In fact, what is happening is an intense process of parasitization (of the market), co-optation (of guests – for various purposes, not only touristic –), coercion (of hosts – who can be owners or real estate companies –) and monopolistic extraction (of profit through the rent of spaces). In effect, this type of applications obtains a profit from the extraction of a percentage of the capital gain materialized in the rent stipulated by those hosts who use partially or totally their homes for short-term rental through such applications (Olmedo-Neri, 2020; Radetich, 2022). According to Srnicek (2018), Airbnb operates as an austere platform, i.e., it builds a specialized market in a service, but at the same time outsources its operation to the maximum until generating the false idea of not having fixed assets (Airbnb does not, so far, offer a hosting where the platform operates as a host). However, by hyper-outsourcing the entire service chain, the application minimizes its expenses, keeping the minimum related to the control and management of the interface, which is "the basic extractive minimum – the control of the platform that allows a monopoly income –" (Srnicek, 2018, p. 72).

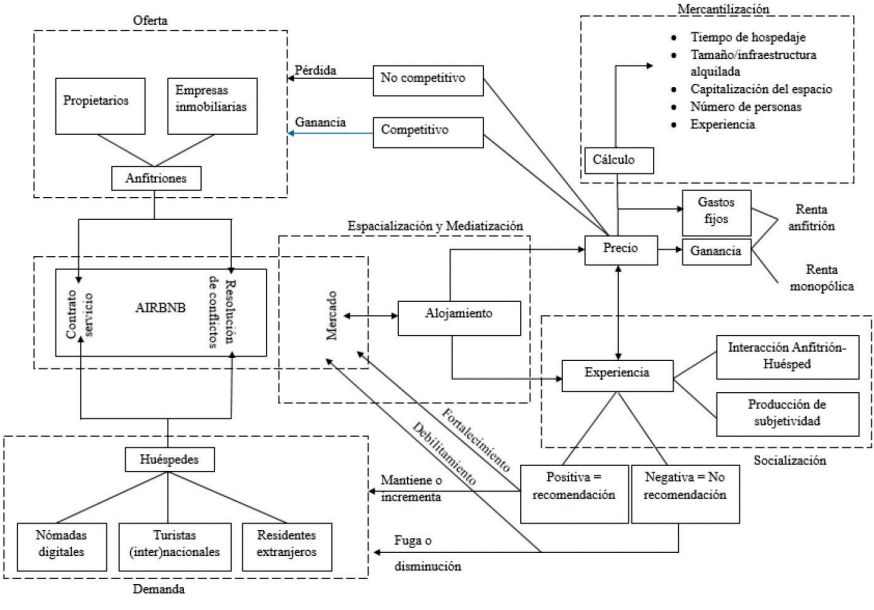
In other words, austere platforms like Airbnb operate under a deep intermediation, a product of control over the digital space where supply and demand meet by contracting spaces for short periods of time.

However, it is important to highlight two key elements for obtaining a profit in this model: the first is that the rental price varies, as does the percentage that the platform receives, extracting a 'pure' surplus (free of taxes and fixed expenses) that would correspond to the host (who must cover the maintenance and services costs derived from the use of the residence), but that this cedes as the right of floor required by said digital market created and co-opted by Airbnb. In addition, the variation of the rent derives from various elements, including the spatial features that each accommodation has (services, location, security, etc.), which allows us to argue that part of the profit of the host and Airbnb derives from the commodification not only of the residence but of the space in which it is located, of its cultural assets and of the public services that both the host and the platform highlight and

commodify as elements that determine the cost of rent and that intervene in the subjectivity created by the guests.

The second important element about this false collaborative economy rests on the reduction of occupancy time, which is in fact the result of the acceleration cycle of accumulation of income; by reducing the time of stay, the price not only increases, but the accumulation cycle accelerates, obtaining a profit similar or higher than that which any lessor would obtain under 'classic' and temporarily prolonged schemes (Olmedo-Neri, 2020). This acceleration and the economic cost involved becomes a mechanism that encourages the exclusion and displacement of those who cannot compete with the new demands of the urban real estate market (Robert, 2021). Figure 1 outlines the operational logic of Airbnb mentioned so far.

Figure 1
Airbnb operating logic from the EPC



From these elements, it is possible to corroborate that the collaborative economy is a chimera that these austere platforms promote, in order to cover up their monopolistic dynamics and the extraction of a pure profit through

the rent of spaces (Olmedo-Neri, 2020). It is necessary to dimension its intervention in the production of space and urban subjectivities.

Mediatize space production and urban subjectivities

To understand the dialectic between platforms and cities, it is necessary to recognize the growing participation of technological innovations in broader processes such as the production of both urban space and spatially determined subjectivities. Thus, we must analyze the ways in which platforms transcend screens to articulate with other phenomena relevant to cities of the 21st century.

In this regard, it is possible to insist that, contrary to the idea of the death of geography with the advent of ICT and the Internet, these techno-info-communicative innovations offer, provide and sustain much of their services/products in a systematic commercial exploitation of space (Buzai and Ruiz, 2012; Radetich, 2022). Thus, the coordinates of users and their habits largely condition both the information circuits that produce/manage/consume and the products and services that they can buy/contract, while transnational companies take advantage of this characteristic to increase their rate of profit through systemic inequalities that allow them to relocate their productive chains and administrative structures (Morley, 2008; Yúdice, 2008).

Therefore, this link shows that the way of living and building the contemporary city is intervened by the new mediatized ways of being in the world. An analytical alibi that allows us to think about these elements is through the notion of inhabiting urbanity, since its production and the subjectivity that emanates from it acquire strong technological features.

Thus, the concept of 'living' can be unfolded in two particular senses: the first form is as an ontological positioning of the subject *in* and *before* the world (social and natural). In this sense, the exercise of dwelling is an intrinsic action of the human being, since it is an inalienable act in his process of being in the world (Arendt, 2009; Lefebvre, 2013; Garcia, 2022). This positioning is sustained through the experience and subjectivity produced in that process of spatial and existential referentiality; thus, urban subjectivity, understood as the heterogeneous and contingent sociocultural and identity tessitura that constructs individually and collectively the urbanite to be (in), flow (with) and live (within) the city, its advantages and contradictions (Vázquez Rodríguez and García Garza, 2015), is (re)produced or dislocated to the extent that a person gains or loses control of that place as that part of the world that is common/own and from where the whole interpellates.

The second sense that can acquire the term dwelling is that which refers to a process that involves this spatial-subjective positioning. Thus, to inhabit is, therefore, a sample of the capacity of agency that the subject has over space and its (in)tangible components; when inhabiting a place, it is systematically impregnated by the senses of the person who inhabits it, i.e., it becomes part of the reference point within the world and from there habits are built and daily life materializes. Thus, the production of urban space is, above all, a transformation process of nature for the development of the social, its rules, its accesses, restrictions and inequalities; following Lefebvre (2013), "(social) space is not a thing between things, a product among the products: rather it surrounds the things produced and understands their relations in their coexistence and simultaneity" (p. 129).

Thus, the production of space never decants into final and immutable product, on the contrary, it is a permanent process that is determined by the acceptance, negotiation and resistance of the various senses that intend to impose themselves in that place, which shows the conflicting essence that becomes in every process of space production (Vergara and Fraire, 2018).

However, these processes of inhabiting the world, which always had a direct relationship between subject and space, have been drastically intervened by ICT, since these tools mediate most of the contemporary social relations (Gómez Cruz, 2022); this process of mediatization has disrupted the situated and historical forms of sociability, to generate new models that tune into the hegemonic mode of production, i.e., capitalism.

Since the first decade of the 21st century, applications that monetize the sense of hospitality and commodify homes have gained ground as a new model of accumulation that, as has already been indicated, is based discursively on a collaborative economy, but that is a form of intermediation that exploits the objective conditions of spaces, whether urban or rural, generating geographically differentiated impacts within the territories where they are installed and from where they impose their logic of exclusion and displacement that aims to establish itself as a new urban societal model (Ciaramelli, 2023).

Moreover, time in contemporary cities becomes a commodity, so on it operates a cycle of capitalist accumulation founded on the acceleration of all areas of daily life (Olmedo-Neri, 2020; Robert, 2021). Thus, in the current neoliberal project, cities become spaces under intense processes of efficiency and rationalization, turning them into a machine that, through the exploitation

of its components, generates a surplus value that is disputed by the capitals that circulate there (Garcia, 2022).

Under these ideas, it is possible to argue that Airbnb and its operational logic prevents subjects (both floating and permanent residents) from inhabiting the spaces offered in its mediatized inventory. On the one hand, by being stripped or displaced from their dwellings (own or rented), permanent residents see their agency capacity interrupted and limited by not being able to participate in the production of the city as they are forced to de-inhabit a place.

On the other hand, those who rent a space on this platform can not specify a spatiotemporal positioning because that place is theirs partially and temporarily, so they can not exercise total agency since the conditions of the contract limit their ability to be in the world, producing a logic of unhabitability.

In this way, Airbnb's media coverage of the residences it offers on its interface frustrates any effective possibility of inhabiting these places, since those who are displaced lose that possibility, while those who move them cannot inhabit this space completely and authentically. This cancelation severely erodes the (re)production of space, as this business model drives at the mercy of the hosts and the capital, and at the same time it alters the production of urban subjectivities. Thus, Airbnb deploys policies of de-habitability and in-habitability covertly, which are gestated through the commodification of the city and its spaces of residence for benefiting the capital housed in this type of platforms and the real estate speculation already present in the cities.

Finally, the mediatization of spatial segregation phenomena such as gentrification is an articulated and exclusive process. Thus, in the neoliberal city there is an important reconversion in the production of both space and urban subjectivities; we no longer think of a city that adapts to the people who inhabit it, but now we seek the production of a subject that adapts to the new urban societal model (Garcia, 2022; Ciaramelli, 2023; Romo, 2024).

These elements will be crucial since the new urban project will undertake a process of (in)direct displacement on those who do not meet these new requirements from capitalism.

Materials and method

This work is based on a quantitative methodology with a descriptive and spatial scope. The relevance of this methodological design is based on the

offer of analysis that cross the dimensions of power between technology and space, in this case the urban one, thus expanding the scale of analysis without losing sight of the dialectics that operate in its articulation.

Thus, the corpus of analysis lies in the Airbnb accommodation database in Mexico City, which is produced and published by Airbnb Inside (2024)1. This platform is part of a broader social project that seeks to make visible the impacts of this type of applications in cities, so this data activism based on *data scraping* allows to promote situated analyses that would be more difficult to perform due to the lack of transparency and willingness of the application itself to release the precise data of the accommodations it offers through its interface (Gainsforth, 2021).

The analysis focused on the capital of Mexico is that the studies on the integration of platforms such as Airbnb in the urban scenario have been concentrated at different analytical scales (at the colony,2 mayor and state level) within this political-administrative territory (Montes de Oca *et al*., 2018; Zamorano Villarreal, 2019; Olmedo-Neri, 2020; Villar Calvo *et al.,* 2021; González Loyde, 2023), so the contribution of this work falls on the construction of a panorama at the state and colony level that allows to demonstrate the processes linked to the mobility dimension and economic marginalization of this phenomenon.

The data obtained were subjected to a systematization and cleaning process in spreadsheets and dynamic tables that allowed homologating criteria of referentiality in the context of Mexico City. Afterwards, a georeferencing and analysis process was carried out from the use of Geographic Information Systems (GIS), particularly the ArcGIS software was used, since it allowed to spatially locate the accommodations and from this calculate their density at the colony and mayoral level. It was possible to explain the dynamics of urban fracturing and commodification generated by Airbnb through its business model.

Finally, various maps, graphs and tables were made that show the Airbnb panorama in Mexico City, highlighting its location and articulating its heterogeneous spatial distribution with other variables such as access to public

1 The update of the data is given on a quarterly basis, so the data made correspond to September 2024.

2 According to the Diccionario del Español de México (DEM, 2025), a colonia is defined as "each of the urban areas that forms around the center of a city"; in a definition closer to the urban perspective, it could be understood as a group of areas that obtain a name from an identity trait (for example, the Colonia Escandón, Colonia Centro or Colonia Doctores). The use of this term is very frequent in Mexico, however, it does not present substantial differences with those employed in other countries such as, for example, neighborhood. In this way, they could be considered synonyms.

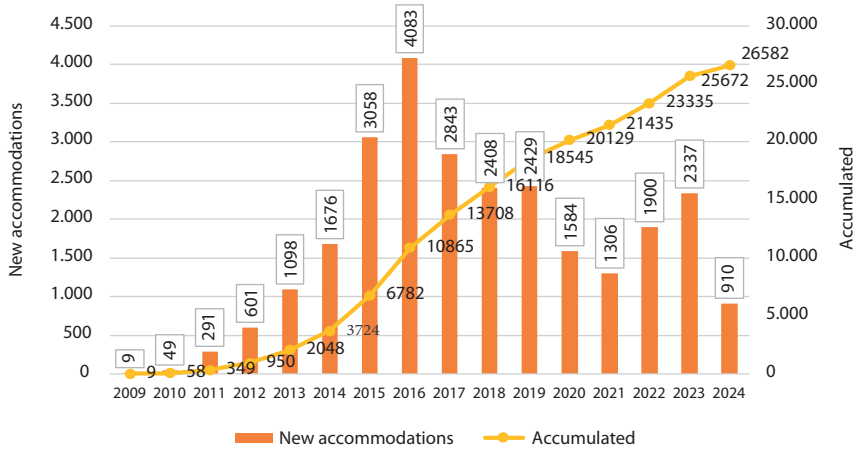
mobility services that have been developed in the capital of the country and security levels within the capital colonies.

Results

The findings show that, for the third quarter of 2024, in Mexico City, there are 26,582 accommodations within the catalog of this austere platform. Figure 1 shows the growth of accommodations within the platform, showing that 2016 was the year with the highest number of registered spaces;[3] from there on, 2021 is the year with the lowest registration of new accommodations, so it can be an (in)direct effect of the pandemic.

Figure 1

New accommodation by year (2009-2024)



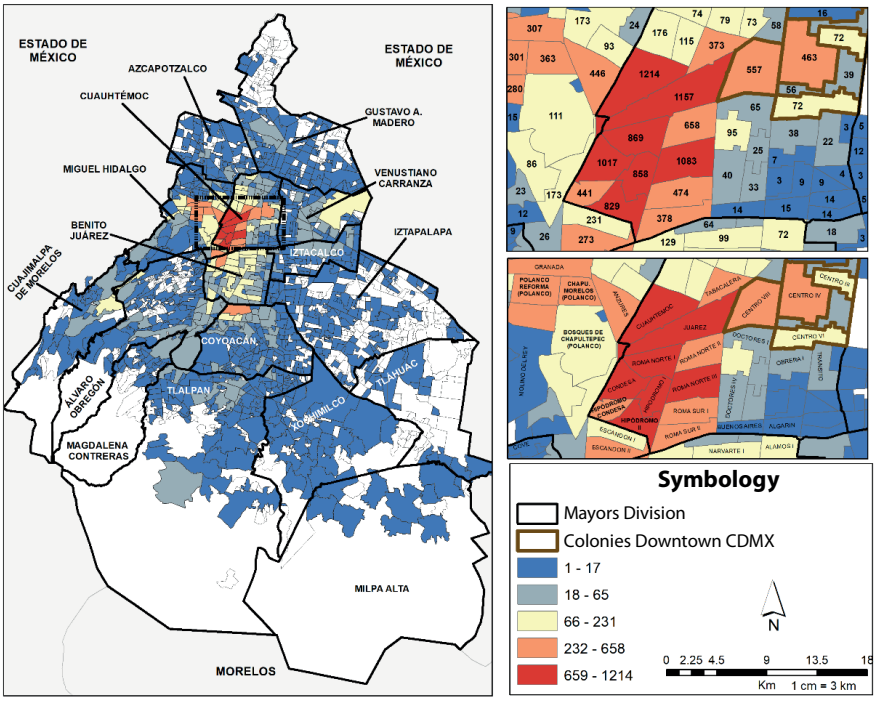
Note. Own elaboration from Airbnb Inside data (2024).

3 It is worth mentioning that the number of accommodations does not correspond to the number of hosts (4,092), because as part of real estate speculation and socioterritorial inequalities to obtain a home in the Mexican capital, there are records of landlords who have more than 100 spaces available for rent. These 'exceptional' cases exemplify the fracturing of sociality in Mexico City. Some of the profiles/hosts with the largest amount of accommodation in the Airbnb catalog are: Blueground (258 houses/apartments), Mr. W (243 houses/apartments) and HOMi (134 houses/apartments).

On a spatial level, these accommodations exhibit their arbitrariness, because as shown on map 1, there are seven colonies, all of them close to the Historic Center of Mexico City, which concentrate many accommodations available to be rented on Airbnb.

Map 1

Mexico City: distribution and number of Airbnb accommodations, according to the area (2024)



Note. Own elaboration with data from Airbnb Inside (2024).

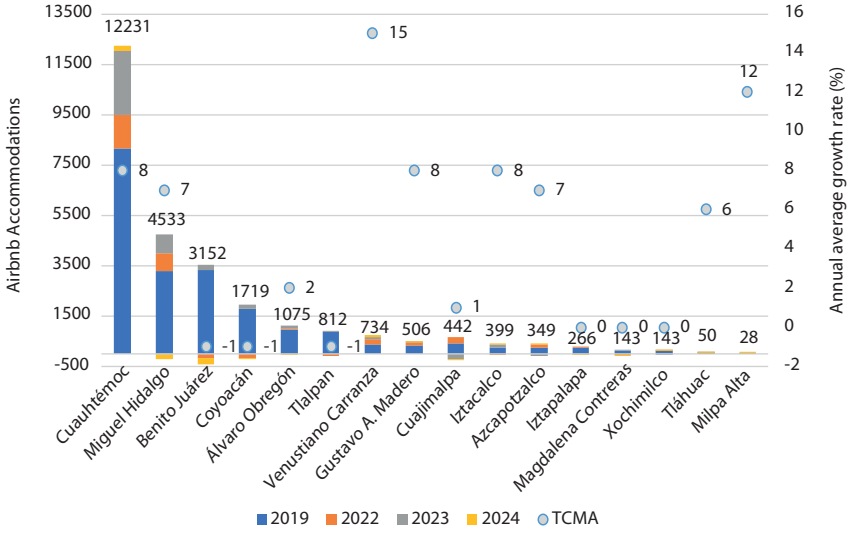
Thus, 26.44 % of Airbnb accommodations are concentrated in the following seven colonies: Cuauhtémoc (1214), Juárez (1157), Roma Norte II (1083), Condesa (1017), Roma Norte I (869), Hippodrome I (858) and Hippodrome II (829). These colonies, in parallel, have been analyzed by the intense gentrification processes that have been suffering since the various urban renewal policies implemented in the capital of the country (Madrigal

Montes de Oca *et al*., 2018; Zamorano Villarreal, 2019; Villar Calvo *et al.,* 2021; Olmedo-Neri, 2024).

Thus, this arbitrary distribution allows to strengthen the idea of spatially differentiated effects. The fact that these accommodations are concentrated in certain areas responds more to dynamics of profitability than to effective possibilities of concretion. Figure 2 shows the growth or not of these spaces in each mayor's office, showing their Average Annual Growth Rate (TCMA) of recent years.

Figure 2

*Number of accommodations by Mayor (2019-2024)***4**



Note. Own elaboration from Airbnb Inside data (2024).

As it is observed, Airbnb behaves differently according to the mayor's office, evidencing its arbitrariness in terms of its planning and territorial expansion. Regarding the TCMA, its behavior is heterogeneous, showing ma-

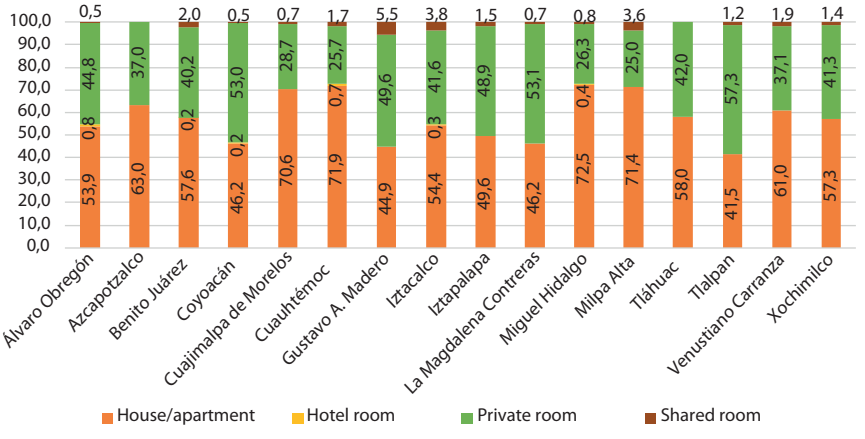
4 Given the large amount of data, Airbnb Inside (2024) tends to reduce the availability of historical data, so it was not possible to rescue the 2020 and 2021 data for this analytical exercise.

yoralties that are reaching a saturation point that has forced them to decrease, while others have had a higher growth than in those mayoralties where they have a pronounced presence.

However, a key element for this type of analysis lies not only in the location, but its articulation with the composition of the lodgings, i.e., what type of spaces are rented according to the mayor's office in which they are located. Figure 3 shows this distribution.

Figure 3

Percentage distribution of Airbnb by type of accommodation, according to the Mayor's Office



Note. Own elaboration from Airbnb Inside data (2024).

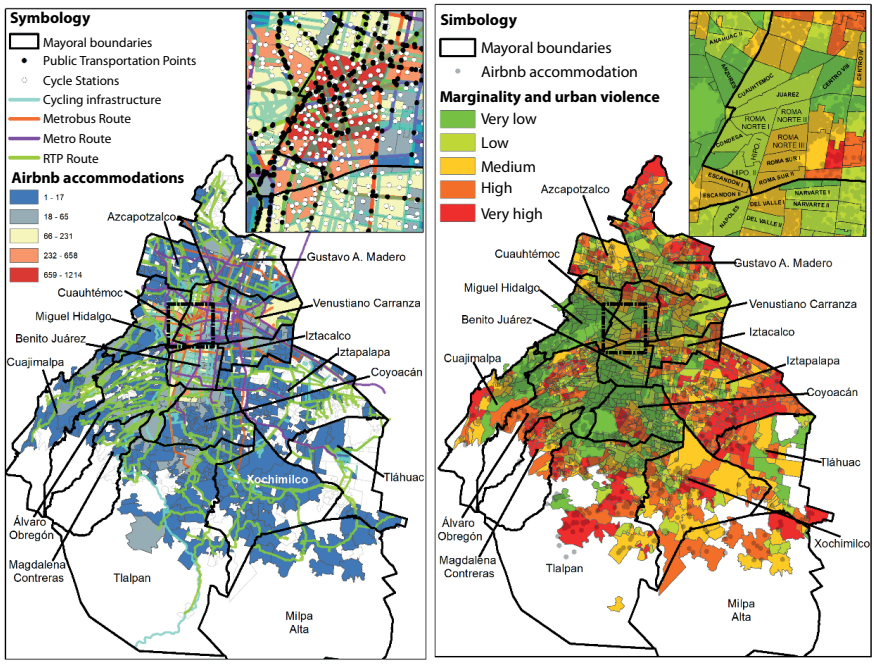
This scenario is crucial because it exhibits the dynamics of de/repopulation of these spaces and mayoralties as part of the profitability of their rent on Airbnb; while a private or shared room implies a partial rent within a residence, the total rent of these places —added to the type of owner with which it interacts— shows a coercive mechanism that deprives local residents of these spaces for the cost of their rent under this accelerated and rationalized form of the habitability of the city.

Once we know where these accommodations are concentrated, it is clear to observe the intersectionality that these colonies acquire in terms of ser-

vices, such as transport and urban marginalization/violence.5 Thus, map 2 shows the intersection of these factors in Mexico City.

Map 2

Mexico City: Mobility and urban violence according to the Mayor's office



Note. Own elaboration with data from Airbnb Inside (2024), CentroGeo (2022) and Government of Mexico City (2022).

These images offer two key elements: in terms of mobility; the colonies with the largest number of accommodations are well connected and with a wide and diverse offer of public transportation means. Of them, cycling stations stand out because they have become a favorite mechanism for new generations and especially those that bet on alternative forms of individual cut

5 This information has an intersectional character that includes, among other things: access to public space, urban deterioration, panic buttons, income/poverty, security coverage, quality and housing spaces (CentroGeo, 2022).

for urban mobility; next to cycling stations follows the cycling infrastructure, which, as it is observed, also has an unequal distribution since the majority is concentrated in the Cuauhtémoc and Benito Juárez Mayor's Office; as it moves away from these spaces, the transport offer is drastically reduced as a result of the centralization of resources and services, typical of Latin American cities (Olmedo Neri, 2024).

With regard to marginality and urban violence, a similar trend is shown, since a good percentage of the accommodations are located in places where these indicators are low, intervening directly in the production of the urban subjectivities of the guests. To reaffirm this idea, Table 1 is presented.

Table 1

Airbnb accommodation by marginality level and urban violence

Marginality and urban violence	Number of accommodations	Percentage (%)
No data	21	0.079
Very low	9101	34.23
Low	10.335	38.88
Average	5577	20.98
High	1219	4.58
Very high	329	1.24

It is possible to observe that 73.11 % of the accommodations are strategically located in colonies where marginality and urban violence are low or very low, evidencing that their location not only responds to places well located within the urban infrastructure, but at the same time these are spaces where violence does not operate in a structural way as in other colonies and mayoralties.

Finally, it is important to mention how these spatialities are reflected by economic dynamics; for this purpose, map 3 is presented, which shows the average ranges in which the rental price of Airbnb accommodation varies according to the colony.

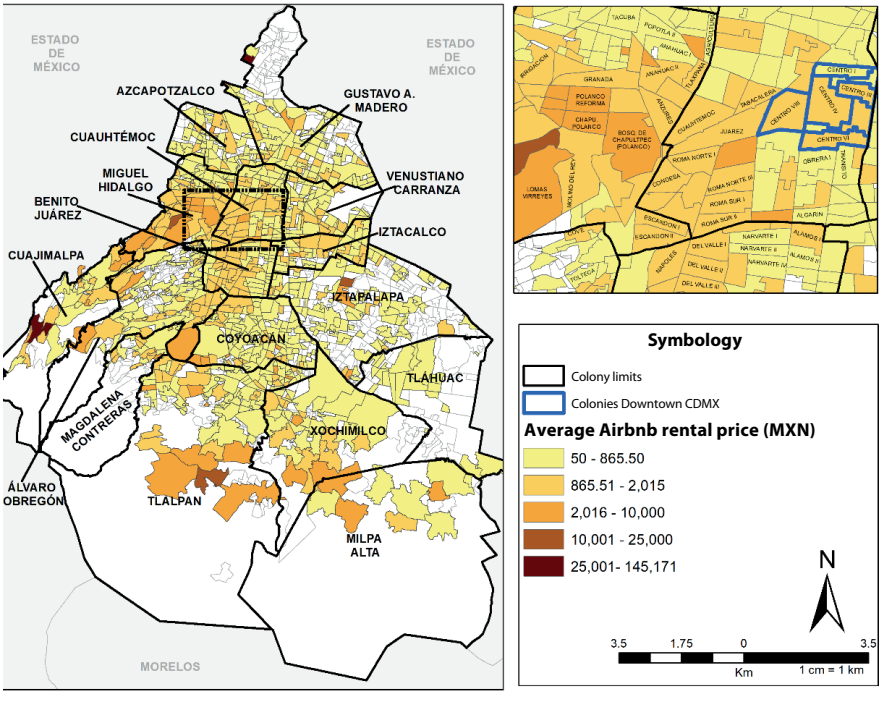
From this, the colonies begin to change their constitution because the price of space rent has an upward trend; this increase in income stimulates not only direct effects for the displacement of the resident population, but indi-

rectly creates transformations such as the change in commercial spaces and the progressive increase in the lifestyle (Olmedo-Neri, 2024) begin to occur.

These strategies show how Airbnb not only intervenes in the production of urban space, but adds challenges that intensify the possibility of remaining places for the middle classes or that, as in many of the contemporary cities, rent residences in the face of the spatial and temporal tyranny that supposes being/living/transiting from the periphery to the city.

Map 3

Mexico City: average rental per colony



Note. Own elaboration with data from Airbnb Inside (2024).

These results provide an overview of Airbnb's presence in Mexico City. In addition, the visualized elements invite us to reflect on the challenges that arise for a city like this at the dawn of the 21st century and under the afore-

mentioned economic forces that try to transform cities into commodities and strip them of all possibility of habitability.

Conclusions and discussion

This work aimed to build a panorama on the deployment of Airbnb in Mexico City. It was possible to find results that strengthen the elements raised from the EPC through a descriptive quantitative analysis and its subsequent spatial visualization.

As a first relevant point is the fact that most Airbnb accommodations tend to be located in places near the historic center of Mexico City; this has consequences both in the colonies where the popular classes predominate and in those where there are already other processes of struggle for the right *to the city.* Especially, it is important to note that some of the colonies where there is a high concentration of Airbnb accommodation also have varying degrees of gentrification, reinforcing the approaches made in other research on the parallelism between gentrification and the presence of Airbnb (Zamorano Villarreal, 2019; Villar Calvo *et al.,* 2021; Olmedo-Neri, 2024).

The second element is that the location of these accommodations is arbitrary and extractive, so that those areas better connected, with greater availability of public transport and with low rates of marginality and urban violence become desirable and viable for commodification. For example, mobility in the city through public transport, due to its sociohistorical conditions of production, becomes a vital resource for the process of inhabiting a city, so its access/restriction has serious effects on the production of urban subjectivities since the ambivalent acceleration/slowdown of mobility is a constant feature of urban life,especially in Latin American cities (Olmedo-Neri, 2020).

Thus, a first explanation of this logic would lie in the neoliberal project that has been promoted for several years in the various cities of the region and the world, because by locating accommodations with these conditions not only guarantees the platform the ability to capture the interest of potential guests, but in this way public spaces, resources and services are co-opted, or as proposed by Radetich (2022) "appropriate", to insert accumulation cycles sustained in the commodification of urban space and respective urban subjectivities.

Thus, offering well-connected, centrally located accommodation with low levels of violence/criminality not only guarantees a predetermined urban

subjectivity that increases the probability of the guest renting the place again, but also ensures the temporary consumption of the city, progressively canceling its ability to (re)produce itself as a living space and becoming a commodity available to those who can afford it (Vollmer, 2019; Gainsforth, 2021).

On the other hand, the approach that urbanized spaces display simultaneous mechanisms of de-habitability and non-habitability is reinforced, since permanent residents lose the ability to reproduce the city —by being displaced directly or indirectly— and their urban subjectivity is strongly disrupted and diminished by being excluded. At the same time, these residents are forced to displace others in order to mitigate the impact of their expulsion on their daily lives; this forges the domino effect of segregation phenomena such as gentrification (Olmedo-Neri, 2024), accentuating the marginalization of some social groups and further reducing their ability to exercise the right to the city. For their part, those who arrive to a city via Airbnb cannot inhabit the place since their interests are not of permanence, but of transit, so they are unable to participate in the production of social space and the subjectivities that the city produces them are determined by the capitalization of the infrastructure, (in)tangible resources and present/close services obtained by the permanent urbanites (Radetich, 2022). In this way, the local production of space loses legitimacy, which is exacerbated by the progressive displacement of those who disinhabit that place.

For these reasons, Airbnb and all those applications that monetize space, mobility and services disrupt and erode the practices, senses and knowledge produced intersubjectively in the neoliberal city. All this inevitably leads to the erosion of social ties, the fragmentation of urbanity and its transformation into a rationalized and accelerated place-machine in an economistic way (Robert, 2021; Garcia, 2022). Therefore, both Airbnb and real estate speculation operating at a subnational level cancel out any ability to inhabit urban spaces. This means that, in the neoliberal city, the control of urban subjectivity and habitability occurs indirectly through the production of private and public spaces. In this way, size, structure, services, design and aesthetics condition the agency capacity of the subject on the rented residence, in turn shaping its subjectivity around the city and its public spaces-resources.

From these elements, it is crucial to discuss the positive or negative involvement of Airbnb in the prefiguration of the right to the city. If, as Harvey (2013) states, the right to the city "is therefore much more than a right of individual or collective access to the resources that it stores and protects;

it is a right to change and reinvent the city according to our desires" (p. 20). From what was found, it is observed that the current operation of Airbnb is promoting a subtle change, but of great impact on the way of thinking about the cities, because with each new accommodation available to floating residents and social classes with high purchasing power, the right to the city is transmuted into the privilege to the city, i.e., the possibility not to inhabit the city, but to consume it temporarily and repeatedly as long as the subject has the economic capacity to do so. Only with the commodification of the city and the consequent privatization of the right to inhabit it is possible to expel those who cannot adapt to the new conditions demanded by the city itself as a capitalist societal mode.

In this way, this privilege to the city can be understood as an ideological, spatial and economic project by which the city operates no longer as a habitable place, but as a means of production by which capital exploits space to obtain a surplus value through its transformation into a commodity in permanent consumption. The privilege to the city is evidenced in the distribution dynamics of Airbnb accommodations, since most of the active accommodations in Mexico City are not only a guarantee of multiple points of public transport and proximity to spaces where Mexican city life is concentrated but are also located within colonies where marginalization and violence are low.

In other words, Airbnb's business model contributes to urban metamorphosis in a negative way because it transforms the urban rights achieved gradually and historically by its inhabitants, into privileges accessible only to certain population sectors with high purchasing power. Thus, by operating in cities with high population density and social inequality, austere platforms like Airbnb intervene in the city's production and contribute to the logics of social segregation and exclusion.

In addition to the above, there is the exploitation and deepening of the socio-territorial inequalities around the cities of the 21st century, since the concentration of houses, apartments and rooms by hosts goes hand in hand with the erosion of objective conditions so that the population of popular classes has the right to a property; on the contrary, the logic of commodification of the city forces to systematically increase the population that does not have the economic capacity to become a residence, forcing it to wander through the neoliberal city through renting as a new way of inhabiting the urban space (Gainsforth, 2021; Garcia, 2022; Ciaramelli, 2023).

In this way, the neoliberal city promotes a new societal project founded on the privilege of the city, where gentrification operates as a mechanism of expulsion and where hosting platforms such as Airbnb erode the habitability of the city under an instrumental and accelerating reason. Given this situation, it is necessary to observe in future research how dispossessed urbanites organize themselves to face advanced capital and how to recover/prefigure their right to the city in contexts marked by a growing and unfavorable correlation of forces.

One way to analyze this dimension lies in the complicity or commitment of governments to face or not this situation. In Mexico, in October 2024 an amendment was made to the Tourism Law of Mexico City, as well as the Housing Law and the Law for the Integral Reconstruction of the capital to, among other things, establish a maximum of six months of the total rental time of a property and prohibit the registration on Airbnb of homes of a popular or social character or that have been rebuilt by natural events such as earthquakes (Rodríguez Soto, 2024). These measures are similar to those that have been implemented in other countries such as the United States, Germany and Spain (Vollmer, 2019; Gainsforth, 2021), so it is necessary to continue evaluating this dimension hand in hand with a territorial order that seeks social justice. The spatial panorama presented is configured as a viable method that can be useful in the territorial planning of cities, offering elements to regulate, for example, the number of accommodations of this type of platforms according to the colony or neighborhood, as well as to allocate a part of the taxes charged to these platforms to improve other urban areas to reduce socio-territorial inequalities (security, mobility and rent price) within cities.

One element that would contribute positively to these processes of regulation and territorial planning would be the transparency of the data related to the location of these accommodations by Airbnb as necessary inputs for the development of public policies that allow to curb the socio-spatial dislocations parallel to the operation of the austere platforms.

These efforts show the beginning of the positioning of the Mexican State and governments in the face of the problems that affect its inhabitants in the face of new global dynamics of eventual human mobility and for various purposes. These processes of digital and territorial regulations are fundamental parts of the contemporary urban question. What is clear is that governments cannot deny the right to the city to their own citizens. In fact, from a social justice perspective, the right to the city in the 21st century may be an-

ything but negotiable, so the denunciation of its transformation into a privilege should be echoed in the near future.

Finally, it is important to insist that to think about the city of the 21st century it is necessary to recognize and integrate platforms and their business models as elements that intervene in the production and arrangement of contemporary cities.

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Psychosocial production of public space in anti-repressive collective action

Producción psicosocial del espacio público en la acción colectiva antirrepresiva

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Resumen
El estudio analiza la producción de sentidos psicosociales en torno al espacio céntrico de la ciudad de Córdoba, Argentina, desde la perspectiva de jóvenes que se movilizan en una acción colectiva antirrepresiva denominada "Marcha de la Gorra". En esta manifestación se denuncia la regulación material y sensible que opera la vigilancia policial sobre determinados cuerpos (en particular, juventudes de sectores populares), la cual tiene como efecto la obturación o inhibición de la libre habitabilidad del espacio público. El objetivo de investigación fue doble: 1) comprender, desde una perspectiva psicosocial, cómo procede la segregación socioespacial operada por el control policial selectivo y, a la par, 2) reconocer los sentidos subjetivos y espaciales que produce la irrupción de la acción colectiva en el espacio disputado. Para ello, se trabajó con un enfoque cualitativo, apoyado en el registro etnográfico de la movilización y en entrevistas cualitativas con jóvenes participantes (entrevistas en profundidad y conversaciones en marcha). Por tratarse de un estudio de largo plazo, entre 2014 y 2022, se entrevistó a más de 60 jóvenes, de entre 16 y 31años, participantes de la acción colectiva en análisis. Entre los hallazgos principales, se identificó que la producción psicosocial del espacio público en el ámbito de la acción colectiva se expresa en tres dimensiones: las intervenciones artísticas en la calle, la corporización de la protesta y la colectivización del conflicto.

Palabras clave
Juventud, espacio público, acción colectiva, emociones, cuerpo, seguridad, zona urbana, psicología social.

Abstract
This study analyses the production of psychosocial meanings around the central space of the city of Córdoba, Argentina, from the perspective of young people who mobilize in an anti-repressive collective action called Marcha de la Gorra. This action denounces the material and sensitive regulation that police surveillance operates on certain bodies (especially, youth from popular sectors), which has the effect of inhibiting or blocking the free habitation of public space. The research objective is twofold: 1) to understand, from a psychosocial perspective, how the socio-spatial segregation operated by selective police control proceeds and, at the same time, 2) to recognize the subjective and spatial meanings produced by the irruption of collective action in the disputed space. For this, a qualitative approach was used, supported by the ethnographic record in the mobilization and qualitative interviews with young participants (in-depth interviews and conversation-in-march). As this is a long-term study conducted between 2014 and 2022, more than 60 young people, aged between 16 and 31, who participated in the collective action under analysis, were interviewed. Among the main findings, it was identified that the psychosocial production of public space in the sphere of collective action is expressed in three dimensions: artistic interventions in the street, the embodiment of protest and the collectivization of the conflict.

Keywords
Youth, public space, collective action, emotions, body, security, urban areas, social psychology.

Introduction

It is necessary to mention that the analyzes presented in this work are around the (psycho)social production of *urban* public space. In this line, the work is anchored in the city of Córdoba, Argentina, particularly, in the collective youth action called "Marcha de la Gorra". The study of this mobilization took place over nine years, in the framework of a doctoral thesis in psychology. This action characterizes as "anti-repressive", since its demands are aimed at questioning and denouncing the selectivity of the police control to operate on bodies in the urban area, especially on the popular and juvenile.

Contributions from the social sciences regarding the social production of space are used. Then, "Marcha de la Gorra" is placed as an action that highlights the axial character of the spatial dimension, in a double sense: on the one hand, the denunciation of the sociosegregation in the city of Córdoba and, on the other hand, the political and subjective senses that houses the

massive irruption of bodies in the same space from which they are expelled daily: the center of the city.

The presentation and discussion of the results of this qualitative research will allow us to address the main questions: How do the processes of inequality and segregation materialize in the public space and in the daily relations that are deployed there? What is the subjective and spatial senses of the anti-repressive mobilization in the street? From this double question, we will advance in the understanding of what we call *psychosocial* production of public space, in relation to the subjective and spatial transformations promoted by collective action.

About the social production of space and urban sensitivities

The theoretical and conceptual contributions of the social sciences are copious in order to understand the social production of public space, as well as its conflictual dimension. Growing up in anthropology, Augé asserts that the world can be thought of as an immense city. A city-world within which products, messages, arts, fashions, etc. circulate and exchange. At the same time, each great city is a world, because of the ethnic, cultural, social and economic diversity it hosts. The metropolises reflect through their architecture and aesthetics on the great inequalities and diversities of the world through walls, separations and barriers (material and symbolic) that are expressed in everyday practices (Augé, 2015).

From critical geography and urbanism, Harvey (2013) states that the development of cities is linked to capitalist modes of production, so the processes of urbanization reflect class division. Such a configuration tends to dismiss the city as a social, political, and vital common good. In this sense, it is unproductive to think of the spatial question outside of a conflict-contemplating view. Peña (2014) argues that public space constitutes a stage for disputes over the production and reproduction of social practices, either in order to sustain existing spatial relations or to transform them. In this sense, the apparent state of fixation or structure with which space is usually represented is rather an illusion that masks a dynamic of antagonisms and tensions between projects, possibilities and social sectors. From social psychology, Vidal *et al.* (2014) have affirmed that subjects and collectivities transform space through action on the environment, intervening in it symbolically and affectively. The actions give the space a singular and social sense, and these,

in turn, are intertwined with the emotional experience that spatiality arouses. In this regard, subjectivity is composed of spatial textures. Lacarrieu (2017) has also insisted that urbanity reflects on state-market relations. Examples of this are the processes of gentrification and the building, real estate and socio-economic transformation that are imposed in certain urban sectors. However, it highlights that despite the strong trend of privatization imposed by capitalist and neoliberal logic, public space continues to exist, exposing subjects to the possibility of being, seen, touched or confronted, embodiing that conflict.

There are numerous studies in Latin America on the social production of public space. Lindón (2015) asserts that cities constitute disputed zones in which the experience of circulating/inhabiting appears strongly permeated by ethnic and class conditioning. Thus, it claims the approach of space in *experiential* terms and proposes to investigate the ways in which the urban is acted, modeled, contested, and inscribed in bodies. In this sense, collective actions are shown as a fertile ground for exploring conflicts linked to public spatiality. Thus, there are several examples that show how inequality and dissent permeate the configuration of urban space in Latin American cities, constituting a regional problem. We can mention the studies around the most recent social outbreaks in Chile (Campos-Medina and Bernasconi-Ramírez, 2021) and in Colombia (Lisset-Pérez and Montoya, 2022), as well as the actions of reappropriation of the Castilla Park, in Lima, Peru (Del Castillo, 2021), urban movements in which the occupation of public space played a key role in the politicization of conflicts. This group could include the "Marcha de la Gorra" (Córdoba, Argentina), which is the empirical reference of this work.

Delving into the Córdoba context, we find a profuse field of work that has addressed the issue of public space and inequality. First, the work of Cervio (2015), inscribed in the perspective of the sociology of bodies and emotions, in which the author addressed the socio-spatial segregation in the city of Córdoba from the 80s, within the processes of capitalist structuring. The author points out the progressive differential occupation of the peripheral area, depending on class positions, a reflection of an urban valorization policy oriented to private capital. More recently, San Pedro and Herranz (2017) and Boito and Salguero-Myers (2021), have indicated that the central areas of the city are outlined as closed spaces for those subjects who do not meet the criteria of social desirability, who are relegated to move in the peripheries. In turn, they argue that the location of the popular neighborhoods, notably distant from the urban center, obstructs even more the possibilities of transit of its inhabitants.

At the same time, numerous local investigations suggest that public security policies and the deployment of police forces are a key piece of control and regulation of public space (Bologna *et al*., 2017; Guemureman *et al.,* 2017; Pita, 2021). Schaefer Square (2020) points out that this materializes in the heavy police presence in the streets and in an increasing number of arrests aimed at a specific group: young men from peripheral neighborhoods of the city.

From a psychosocial approach, Bonvillani (2020; 2023) analyzes the scenarios of police harassment directed at these young people within the framework of the Cordoban security policy. There, he addresses the arbitrary way in which police detentions proceed in central areas of the city, registering them as persecution practices. Security policy as a power device operationalizes a logic of segregation based on stigmatizations linked to body traits: skin color and certain aesthetics linked to popular neighborhoods.

However, public space does not only operate as surveillance territory. On the contrary, it is a space capable of being transformed and redrawn in function of social action. By constituting the venue of the fortuitous and spontaneous encounter between many different social sectors, the public space is a *way* for the disruption of what is instituted. In this context, Mr. Peña (2014) stressed the importance of approaching collective action from a spatial perspective. Precisely, part of this conflict knot is evident in the so-called "Marcha de la Gorra".

About the *Marcha de la Gorra* in Córdoba

The conflict raised above around the crossings between public space-inequalities-police surveillance is observed in *Marcha de la Gorra*. This collective action was launched in 2007, by a group of young people, territorial leaders and social organizations, with the purpose of denouncing situations of police abuse, especially arbitrary detentions. Since its origins, the mobilization has been replicated annually, reaching eighteen uninterrupted editions. In its statement of demands, there is an emphatic claim regarding public security policies, particularly in relation to police action. In the first editions, there was a predominant repudiation of the systematic and arbitrary nature of police detentions in the central areas of the city, especially aimed at young people from the popular neighborhoods. This selective surveillance results in interceptions and searches on the public roads. Therefore, the core of the March's demands bears a significant spatial dimension. Subsequently, along

with the conjunctural transformations and some upsurge of the security scenario, the March was incorporating other slogans related to institutional violence, highlighting the demand for justice for the so-called *trigger-happy* cases, referring to episodes of police lethality (Pita, 2019).

The difficulties faced by popular youth in living, circulating and remaining in the urban spaces of Córdoba constitute a psychosocial problem that damages their citizenship status. Precisely, the mobilization has this name because the cap is a costume element commonly chosen by the youth of the neighborhoods of Córdoba. In this sense, it is possible to identify a first performative intervention in the public space: the massive wearing of caps for the staging of the protest. Much of the uniqueness of this mobilization lies in the artistic repertoires and expressive resources (Scribano, 2009) that are put into play: banners, colored flares, street *graffiti*, chants, theatrical devices, murgas, own sonorities (drums, quartet rhythms, rap improvisations), and even the intervention on the marching bodies: paintings, inscriptions and costumes.

Photo 1
13th Cap March in Córdoba, Argentina, 28-11-2019

Note. https://bit.ly/3EaHBxr

From 2014 there is a collective ethnography around this event, with the purpose of exploring the processes of political subjectivation of these youth regarding the inhibitions and prohibitions that the security device introduces in relation to public space. The methodological strategy deployed is described below.

Materials and method

The study has a qualitative approach, with the purpose of understanding the senses that build the mobilized youth about the regulations in public space exercised by the police, as well as analyzing the new bodily and spatial senses that occur from collective action.

Our research trajectory around this problem extends between 2014 and 2022, whose main empirical reference has been the collective action "Cap March", in the city of Córdoba. Thus, we carried out a collective ethnography of this event that involved the triangulation of various data construction techniques, including: participant observation and ethnographic record, photographic and film record, and the so-called "ongoing conversations" (Bonvillani, 2018), which constitute bounded dialogs with marchers, in the context of the mobilization. The ethnographic registration sessions concentrated on the dates of the March, as well as on some previous organizational meetings of which we participated as a research group.

In addition, these instruments used *in situ* were complemented by in-depth interviews with young marchers. The final data *corpus* was composed of 28 ethnographic recording sessions, 35 interviews with young people (5 of which were group) and 26 ongoing conversations. The methodological mosaicism (Bonvillani, 2018) that supported the study allowed to articulate different forms of entry to the field, in order to address the complexity of the phenomenon studied.

Around 60 young people, aged between 16 and 31, participated in the different interview stages. We worked with a theoretical sampling, and considered as sampling criteria the balanced composition between men and women, as well as the inclusion of non-binary identities; the general inclusion criterion was to have participated at least once in this mobilization. At the same time, we considered the incorporation of young people from different neighborhoods of the city; and the diverse inclusion of what we call "typologies" of marchers, referring to self-summoned young people; members of

social and territorial organizations; members of student organizations; artists and political party militants. In all cases, the consent of the participants was obtained, after they were duly informed about the purposes of the study. The interviews lasted approximately one and a half hours, and were transcribed for further analysis. They were oriented by a script of topics related to motivations to participate in the March; daily experience in the public space of the city, especially in central areas; and experiences with the police in that space. All the field passages included in this article have been labeled with fictional names, in order to protect the identity of the participants. Also, in each fragment, when local categories appear, they are clarified in square brackets to facilitate the understanding of the stories.

Finally, data analysis was guided by Data-Driven Theory, following its two general strategies: constant comparative method and theoretical sampling (Glaser and Strauss, 2006). The data analysis followed a sequential coding, starting with an open coding of the empirical corpus, followed by an axial coding based on the first identified categories, to finally focus on a selective coding based on three main topics: "difficulties to inhabit the public space", "experiences with the police" and "politicization of public space", which allowed hierarchizing the information obtained. This process was carried out through the qualitative analysis software Atlas.ti (version 8.4.24).

Results

Sociospatial and racializing segregation in the city of Córdoba

In general, in the interviews with young people participating in the Cap March, three narrative lines appear in which the discretion of police control materializes: the class, the territorial registration of the subjects (neighborhood belongings) and the ethnic-racial component. At the same time, the selectivity on these three dimensions operates in a double spatial anchor: on the one hand, the police interceptions (Lerchundi, 2023) in the central areas of the city and, on the other hand, the focused control in the popular neighborhoods. We will review these aspects from the collected youth accounts.

The apparent continuity of the city map quickly shows, in the symbolic and experiential record of these young people, the borders and sensitive gaps that cross a fragmented Córdoba (Boito and Salguero-Myers, 2021). Po-

verty conditions are identified as a central feature that predisposes to police harassment. At the same time, the class is intertwined with the territorial dimension and with the daily experience of growing up in a popular neighborhood, with the conditions imposed by the relations of inequality with respect to other social classes or territories:

> We are here because we are against police violence against poor children. Kids from the humblest neighborhoods are always taken by the police. (Conversation underway with a young woman from a neighborhood organization. 20–11–2014)

> No matter the government party, poor people are always targeted. There's an insistence on targeting the poor, the black, the marginalized, who are always left out, or not? (Sara, 21, murguera and social organization activist. 26–11–2019)

At the same time as the class-territory dyad, the ethnic-racial question becomes fundamental to understanding the directionality of police action. Perhaps the best metaphor in this regard is the "face-bearing", used colloquially by the youth themselves, as an ironic expression that graphs the weight of phenotypic characteristics in the activation of racial prejudices:

> The face-bearing thing, like an appearance of a black villero as you're told, which is putting on sportswear, or bright stockings, or bright clothes, or the characteristic dress that all people call "villero black" [from the villa]. (Karen, 16, murguera, 16-5-2015)

In this way, blackness or brown skin stand as a feared and condemned attribute, in line with racialized imaginaries (Bonvillani, 2019). This spontaneous social phenomenology is anchored in a socio-historical coding that is frequently expressed in everyday exchanges (Caggiano, 2023).

However, the conditions and prejudices that shape this police objective (Rodríguez Alzueta, 2014) delineate a spatial dimension in the regulations that are established on bodies and practices. Due to the urban location of Cordoba, most of the popular neighborhoods are located on the margins of the city, away from the center of the provincial capital (Boito and Salguero-Myers, 2021). This directly affects the subjective senses (González-Rey, 2013) of the possibilities of access to the city, taking into account that the physical and geographical barriers imposed by distance, the symbolic – and psychological – barriers introduced by police control. These difficulties ge-

nerate feelings of fear, avoidance or apathy that end up discouraging their movement in the city:

> Imagine, since I was 13 years old, I've been on the street, and I've been stopped more than fifty times. Now it's been a couple of days since the police hasn't stopped me, but because I don't go out, but whenever I went out, they would always stop me. (ongoing conversation with Rodrigo, 29. 28–11–19)

Numerous studies have suggested that security policies have a marked territorial vocation with a deployment of specific actions in the popular neighborhoods (Daroqui and López, 2012; Kessler and Dimarco, 2013; Caravaca *et al.,* 2023). These are geo-crime prevention strategies aimed at specific territories (Hernando-Sanz, 2008). This territorial characteristic of surveillance strategies is denounced in various slogans of the March. For example, the 13th edition (2019), whose official slogan was "Your State is not scary, in my neighborhood I do not lock myself up", in a challenging tone.

The issue of police harassment and its systematicity is part of the content of the artistic productions that young people create and replicate in collective action:

> I walk along the pavement; I get stopped by the police. They ask me for a document. I don't have it, I'm sure they'll take me. Being cold and hungry I remember you. Just one phone call they let me make. I want to go home. On the way, a police officer asks me, 'Hey, black, tell me where you're going.' (mobile sound recording of the 9th Cap March, young man rapping on the microphone. 18–11–2022)

The limitations of police intervention for free movement in the city are being experienced with great discomfort. These difficulties are especially highlighted when they try to arrive or stay in the city center, as well as when returning to their neighborhoods:

> They took me to Alto Alberdi, they took me to Observatorio, Bella Vista, Villa Páez, Alberdi [neighborhoods of the city of Córdoba]. Alberdi was where I lived a lot of things with the police, they went there, on those streets, in those places. There I met a lot of guys, there I lived a lot of things, that's where I got up most of the time. (Luis, 24, territorial militant. 16–10–2015)

Selective surveillance sets up a spatial sensitivity in which some places are presented as habitable, while others appear closed. Although it is not a

legal system, but rather a symbolic operation, it exhibits significant effectiveness. To understand this operation, it is necessary to integrate the dimension of sensitivities into the analysis, since a powerful subjective effect of these regulations on access to public space leads to fear, demotivation and inhibition of young people from popular sectors to circulate in territories other than their neighborhoods.

> And leaving the neighborhood is almost impossible. I'm from Los Cortaderos and the kids just stay there, locked up, because you don't know if you're coming back. Once me and a group of boys had gone on a trip, and when we returned, when approaching the terminal, there were already like two police vehicles. When we were going to get off the bus we said: Oh, man! We can't get there because the police is already there. And it's a problem, you know? (ongoing conversation with Javier, a friend of a young trigger-happy victim. 20–11–14)

The administration of public space involves a series of regulations on bodies and the relationships they display with each other and with the space. Lindón (2015) has highlighted the fundamental role that emotionality has in these experiences. Thus, the amount of psychic discomfort that involves living with an image of oneself that is known to be feared and rejected in the public space, permeates the processes of self and hetero recognition among these young people. The allusions to the way they are seen and valued by other social sectors introduce the question about how segregationist processes permeate the constitution of subjectivities, with important subjective effects and on the level of sensitivities.

In short, the youth narratives reflect daily difficulties to leave their neighborhoods, circulate in the city center and access certain urban areas. The mechanisms of control and regulation of the habitability of public space, with a strong emphasis on the protection of private property, can be thought of as an expression of state policing (Roldán, 2023). These regulations are based on unequal class, territory, and ethno-racial belongings, as we have discussed. Likewise, the experiential record indicates that the perception of police control and the way of experiencing the city are strongly imbricated in spatial aspects. But what happens to the experience of space and the city center during their participation in a collective action that claims their right to *appear* in public?

Managing the street: psychosocial production of space in collective action

In our ethnographic transit through the March, in the 8th edition (2014), when arriving at Plaza San Martín – the culmination point of the mobilization, where the closing festival is held –there is a big stencil painted on a column, with the slogan "They always stop me here", and an arrow pointing to the square. The imagery of the March presents a highly symbolic and graphic content. This example also suggests the inauguration of freedom margins facilitated by mobilization, which enable the enunciation and stamping of slogans on public spaces. At the same time, it highlights a paradox that becomes political due to the power plot involved: during the massive occupation of the main square, the denunciation of the daily interdiction that supposes its habitability for the youth of popular sectors is stamped there. The following year, in the 9th edition, on the stage of that same square, a young man took the microphone and exclaimed:

> We are in our square that today we were denied. This square belongs to the youth of Córdoba. This square is the one they take us every day and today we say: Plaza San Martín is ours, comrades! (Ethnographic record at the closing festival. 18–11–2015)

At these coordinates, mobilizing is itself a disruptive action. *Taking the street* for these groups presents, at least, a double valence: on the one hand, the public space is the place shared by a society and, as such, it constitutes a privileged *locus* for conductions of demonstrations with the purpose of making a conflict visible. On the other hand, in the case of this march, the massive influx of thousands of young people into the streets of the center represents in itself a disruption of the previous arrangements that delineate that same space as closed. As we have clarified, if one of the facets of policing is expressed in the unequal regulation of public space, the March constitutes a collective operator that (d) enunciates these mechanisms and establishes a sensitive twist in the uses and participations in said space:

> It is the day when the caps, which are not those of the police, leave the Center. Like black faces, stigmatized faces, come out to the Center and stop the city to say 'here we are', right? And for me it is very important and I like to share it with the Wachos [young people], there, from the neighborhood and the pibas [young people]. (Jonás, 25, neighborhood artist El Tropezón, 17-6-2020)

It is also a take-part in culture: to make visible, to connect affectively and to recognize oneself in the cultural productions and consumptions that they practice daily. The Cap March represents not only the power-being in the city center, but also a power-saying, being able to enunciate in the public space. This exercise of the right to appear and the implementation of a capacity for enunciation that was not recognizable in that *topos* – the Center, the street – implies an opening to new sensitivities. A collective operation is launched that invents and activates new developments, and it does so in places common to the instituted power that it seeks to counteract.

How can we interpret the esteem these young people feel for the Cap March and their drive to participate and mobilize? If etymologically *participating* means taking part in a matter, the possibility that opens the collective action is precisely that of counting as one more part in the sensitive organization of the community. Take-part in the deliveries of the public thing, *appear* where they are not expected. In this sense, the dimension of corporeality constantly emerges as the territorial inscription of the protest (Zibechi, 2022): bodies in the street. Likewise, the political potential of action seems to be linked to the affective production that is shared there: magnetized bodies.

> My hands were shaking, my body was shaking, I was sweating everywhere, it was a [formidable] sailing body burst! And, that, we also nourished ourselves from that to be able to continue. It's crazy. (La Cholo, 24, member of social organization. 26–9–2020)

> I feel very happy and happy to have lived that experience […] so that we can be there and represent a lot of young people from the city of Cordoba, with our rap, with our being as we are, with our accent, with our humor, with our joy. And so, too, with all the pain that is coming from the neighborhood, from a very vulnerable and hostile place, and being able to return to another climate, another response, another alternative that is art, music, the truth that was fierce [phenomenal].

As mentioned, the processes of control and discipline are directed to the territory and to the bodily energies. In this way, it is expected that the resistance processes will also find their agency capacity there. In youth narratives, the body is characterized as a political instrument devoted to action. This offering of the bodily energies to the struggle is materialized in the syntagm "to put the body". A first dimension that stands out refers to the body as a force field. Faced with the different antagonists defined discursively and

affectively: the police, the State, society in general, the sensitive trench of resistance is the body, in the singular, and the collective body, that which is gestated and empowered in the mass gathering.

Photo 2
Artistic intervention with caps

Note. https://bit.ly/3EaHBxr

According to Jasper (2012), collective solidarity, interaction rituals and other group dynamics that occur within collective action give rise to the production of affective loyalties that underpin the sustainability of political actions. This is even the case with shared emotions linked to sadness or anger, since they can strengthen mutual affectations tending to collective creation and the power to act. In the Cap March, anger, far from being denied or postponed, are incorporated into the text of the protest, and even in non-discursive elements, such as artistic interventions and the body repertoire of those who march:

> We transform anger into strength, and sadness into anger. The anger and the strength, and I think that force is seen as very accompanied by what Carnival generates, say, that joy. (Sara, 21, murguera and social organization activist. 26–11–2019)

Group and community associative practices constitute a gesture of resistance as they tend to reduce the areas of precariousness and death imposed by government techniques (Valenzuela, 2019), and form communities of struggle in order to conquer space. The shared experience in the space of the street allows to verify subjectively and collectively the possibility of inhabiting the city in another way, outside the daily restrictions:

> I think that the idea of the Cap March is to be able to be in the center without being discriminated against. That you can walk without being discriminated against by the clothes you wear, or by the color of your skin. That the children of the neighborhoods can leave their neighborhoods also to know other neighborhoods, that they do not stay alone in their neighborhoods, only because they are afraid of the police. (ongoing conversation with a youth from a territorial organization. 23–11–2018)

We notice an irrevocable centrality of the body as a *locus* of resistance to the discourses and practices that pretend to govern it. In the March, the juvenile bodies dance, climb up walls, stencil prints, color graffiti, leave their marks there. They spontaneously move from the sidewalk to the street, moving on the asphalt with the caps and locker rooms for which they are usually detained. In this sense, they constitute corporeal acts of creation, insofar as they inaugurate a universe of meaning that was previously obscured by the very limits that the security device imposes on public space. In the words of Butler (2017), these are performative acts of appearance. The sudden advent of thousands of juvenile bodies implies an instance of visibility, both of the sustained demand, and of the bodily and aesthetic traits that constitute the vehicle of their persecution. In the massive and coordinated call of bodies in the street, the performative exercise of the *right to appear* is materialized, which is, in short, a subjective and collective reaffirmation of the right to the city.

Conclusions and discussion

The analysis of ethnographic records and youth stories has allowed us to draw some lines of meaning in which the subjective transformations that collective action brings about are expressed. In this sense, we warn that the experience of participating in the Cap March brings with it the emergence of new spatial senses regarding those places that are daily restricted by police surveillance. Thus, there are at least three processes that nourish what we call the psychosocial production of space within the collective action: first, the production and staging on the street of repertoires and artistic and cultural interventions especially valued by these young people. As a second point, the centrality that the body-space relationship acquires in the protest. And, third, the deeply collective record exhibiting the March-experience, where, alongside political alliances, affective coalitions are woven. It is worth noting that in practice, these three dimensions operate in a synergistic and articulated way, in this sense, they are separable only for analytical purposes.

As for the first dimension identified, the March operates as a platform for the circulation of the cultural productions of these young people —murguera practice, rap improvisations, stencils, artistic interventions— who find, through collective action, a space for staging in the center of the city: *"*And it was like resisting from art. You can march and show that you can respond with art" (Jonah, 25 years old). Therefore, this entry into public space also implies a take-part in culture, giving rise to a powerful vehicle of political expression.

In a large part of these interventions, the bodies of the marchers are presented as the materiality from which the claim is raised, giving rise to the creation of verbal and non-verbal senses in an anti-repressive way. Intervention in the public space is presented as a quality and power of *coming-between* the streets and bodies: appearing in the public sphere exhibiting and resignifying their discursive, aesthetic and expressive productions. Likewise, the power of mobilization, to a large extent, lies in the permeability of its borders, i.e., the ability to question and affect both those who are convened there and those who become witnesses of its occurrence. Hence, the value of artistic interventions as a way of political enunciation, as expressive resources (Scribano, 2009) that challenge not only those who count themselves within the demonstration, but also those who observe it.

The second dimension, referring to the body-space relationship, takes center stage in the experiential register of the marchers. The March is ex-

perienced as a kind of temporary desecration, as an interruption of a daily life tied to situations of police harassment in the public space: "Transform, at least for a while, these spaces that are guarded. You can indulge yourself in walking around the center, in the March, playing a drummer, singing with your friends" (Lucas, 28 years old). In the temporal-spatial coordinates that the collective action inaugurates, staying on the street becomes a moment for enjoyment, liberation and celebration, as opposed to the fear and apprehension experienced the rest of the year. At the biopolitical level, emotion control mechanisms operate as demobilization and fear strategies, tending to the inertial reproduction of power relations and to discourage transformation options (Valenzuela, 2019). In this sense, the eruption of this youth protest not only destabilizes the daily sensitive regimes, but also pushes the limits of the forbidden, the sanctionable and the feared. Likewise, the affective displays that it provokes enable the proliferation of new senses about public space. Despite the exposure that the occupation of space can entail, the bodies in the street express stubbornness and persistence, they insist on *being there*. Initially, this implies a reconfiguration of the subjective senses with which the space of the street has been previously incorporated, especially of the city center. The diminished possibility of freely inhabiting the central space constitutes the core of the demand for this collective action. Thus, *marching* configures a performative act that makes the satisfaction of that demand effective in the experiential record. The latter highlights the power of the tool-body as a constructor of social significance that, in this case, also involves a resignification of the spatial senses.

Along with the above, the third dimension refers to the collectivized experience in the street. The practices that we have described so far do not constitute maneuvers staged in solitude, on the contrary, they continually open the game to their collectivization. The shared occupation of space gives rise to the creation of new singular and collective senses regarding their bodies and their presence there. The young people involved in the folds of this problem confirm, from the collective formulation of the lawsuit, that it is not a conflict that concerns them individually, nor is it a trademark of their biographies: "It is like all neighborhoods come together. Not only does it happen in one place, but in all Cordoba. I think it's good that neighborhoods come together like this, and march for their rights" (Leonardo, 22 years old). Collective action entails the possibility of registering a discomfort experienced singularly in a process of collective development. It is a sensitive opening to

the collectivization of sufferings, as well as to the strategies of resistance. In this sense, the congregation of these bodies in the street refers to a praxiological exercise of the right to the city, an exercise that allows revalidating the public character of the space.

In summary, the conjunction between the corporatization of protest, the deployment of artistic-expressive interventions in the street and the collectivization of conflict, gives rise to a psychosocial production of space within collective action. Such psychosocial production is supported by the sensitive triangle *bodies-collective action-public space*. As a shared geography, public space becomes a polyphonic canvas capable of housing and replicating a myriad of messages that are inscribed on its walls, sidewalks, streets, urban furniture, etc. There, the capacity of youth bodies to signify, interpret and represent their own existence is amplified. In this way, the Cap March tests the effectively public character of the space, temporarily restoring the injured right to inhabit it. In the exceptional and eventful time that collective action inaugurates, the occupation of the streets enables an entrance to the public as such, a collective reaffirmation that this space also belongs to them.

To conclude, we hope that this study can contribute both theoretically and practically to discussions regarding public space, inequalities and public policies. Although there is a valuable proliferation of social studies about the production of public space, there is not abundant research from the *psi* field, with psychosocial approaches capable of accounting for the effects of security policies and the regulation of public space on the level of subjectivities. Thus, this work aims to complicate and contribute to the theoretical discussion, especially in the intersections between social psychology, critical urbanism and the field of collective action. Likewise, it can provide guidance to design public policies, both in the field of security and those aimed at the young subject. Contemplating the psychosocial dimension and the subjective effects of control policies would make it possible to formulate security programs that do not harm the rights and habitability of the public space of some population groups, in this case, popular and youth sectors.

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Macarena Roldán	Roles: conceptualization, methodology, software, validation, formal analysis, research, resources, data curation, original draft-writing, review-writing and editing, visualization, supervision, project management, fund acquisition.

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Housing problems in La Matanza: an analysis of informal settlements from the perspective of social sensitivities

Problemática habitacional en La Matanza: un análisis de las urbanizaciones informales desde las sensibilidades sociales

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Abstract

The aim of this article is to describe and analyze the informal urbanizations of the La Matanza district, located in Buenos Aires, Argentina, distinguishing the characteristics of each zone into which it is segmented in order to study its socio-economic conditions and its differences. It also seeks to address some social sensitivities as cognitive-affective practices that are structured there, configuring ways of being, feeling, thinking and acting. This approach will be based on a methodological strategy that combines qualitative data - in-depth interviews with civil society organizations related to the housing problem in La Matanza - and quantitative secondary data from a survey carried out by the National Registry of Popular Neighborhoods (Registro Nacional de Barrios Populares).

It seeks to problematize the implications of studying informal urbanizations from a theoretical and background analysis of the subject. From different denominations used in Latin American literature such settlements, villas, favelas, campamentos known in English as 'slums', we coincide in the description of territories that have in common the link with different types of informality, precariousness, risks and vulnerabilities in a context linked to poverty.

Keywords

Settlements, informality, sensitivities, emotions, housing, slums, shanty towns, La Matanza.

Resumen
Este artículo tiene como objetivo describir y analizar las urbanizaciones informales del partido de La Matanza, —ubicado en Buenos Aires, Argentina— distinguiendo las características que presentan en cada zona o "cordón" en la que se segmenta para el estudio de sus condiciones socio-económicas y las desigualdades que presenta. También, se busca abordar algunas sensibilidades sociales en tanto prácticas cognitivo-afectivas que se estructuran allí configurando modos de ser, sentir, pensar y actuar. Este abordaje se realizará a partir de una estrategia metodológica que combina datos cualitativos —entrevistas semiestructuradas a personas que integran organizaciones de la sociedad civil relacionadas a la problemática habitacional en La Matanza— y datos secundarios cuantitativos, desde un relevamiento realizado por Registro Nacional de Barrios Populares.

Se busca problematizar sobre las implicancias de estudiar a las urbanizaciones informales a partir de un recorrido teórico y de antecedentes sobre el tema. A partir de diferentes denominaciones utilizadas desde la literatura latinoamericana como asentamientos, villas, favelas, campamentos y anglosajona como "slums" se coinciden en la descripción de territorios que tienen en común la vinculación con diferentes tipos de informalidades, precariedades, riesgos y vulnerabilidades en un contexto ligado a la pobreza.

Palabras clave
Urbanizaciones, informalidad, sensibilidades, emociones, vivienda, asentamientos, villas, La Matanza.

Introduction

The housing problem refers to the unequal possibilities in the access and use of housing that people have, as well as the conditions of habitability in relation to the quality of basic services, the proximity or remoteness with sources of work, hospitals, educational institutions, transportation, recreational places, green spaces, streams and rivers, dumpsites, polluting industries, etc. It includes the housing, its environment and its connections with the territory (roads, streets, routes, infrastructure that surrounds it with other neighborhoods and cities) that structure ways of living, moving and appropriating the space (Lefebvre, 2017). This definition pursues a sociological perspective that is linked to the structuring theory of Giddens (2003) that involves addressing the ways in which social structure enables or restricts the action of people and gives an account of the way in which time

and space are linked, as well as the principles of organization of life based on these parameters.

We introduce a concept from the sociology of bodies/emotions called politics of sensitivities that crystallize in this process of social structuring (Scribano, 2009). These are cognitive-affective social practices tending to the production, management and reproduction of horizons of action, disposition and cognition that refer to:

> i) the organization of daily life (day-to-day, waking/sleeping, food/abstinence, etc.); ii) the information to order preferences and values (adequate/inadequate; acceptable/unacceptable; bearable/unbearable); and iii) the parameters for the management of time/space (displacement/location; walls/bridges; infrastructure for the valorization of enjoyment). (Scribano and De Sena, 2019, p. 53)

Considering this theoretical perspective, and as part of a work that seeks to contribute to the study on housing problems, the aim of this research is to describe and analyze the informal urbanizations of La Matanza, located in Buenos Aires, Argentina, distinguishing the characteristics in each area in which it is segmented for studying its socio-economic conditions and the differences that it presents. Also, it seeks to address some sensitivities that are structured there configuring ways of being, feeling, thinking and acting (Scribano, 2010). This approach will be carried out from a methodological strategy that combines qualitative data—in-depth interviews with civil society organizations related to the housing problem in La Matanza—and quantitative secondary data, from a survey carried out by the National Register of Popular Neighborhoods (2023).

To describe the housing problems in this specific territory, we first mention some data on a national scale and then we will delve into the local. In Argentina, according to data from the National Institute of Statistics and Census, in the first half of 2024, resuming the Permanent Household Survey, 52.9 % of the population is poor; 14.5 % have partially insufficient living conditions and 8.2 % are insufficient; only 49.5 % of the population has access to the three basic services (running water, network gas and sewage drains); 5.6 % live near dumpsites and 9.1 % in flood areas. Regarding the quality of housing materials, 14.5 % of people have partially insufficient and 8.2 % insufficient housing, and as for overcrowding conditions, 77.6 % represent less than 2 people per quarter, 18.6 % 2-3 people per quarter and 3.7% more than 3 people per quarter (critical overcrowding) (INDEC, 2024). In addi-

tion, according to the National Register of Popular Neighborhoods (2023), 6467 informal housing developments were surveyed throughout the country, including villas, settlements and degraded housing complexes.

La Matanza is a municipality that integrates the urban agglomerate called Gran Buenos Aires. It has a total area of 325.71 km^2, 1 837 774 inhabitants, a total of 577 276 private homes and is divided into 16 localities. The Unmet Basic Needs index is 12 %: out of a total of 484 909 households, 58 053 have unmet basic needs. It presents a deep segmentation and socio-spatial segregation that divides the territory into three zones differentiated in terms of their socio-habitational, economic, environmental and cultural characteristics, but if moving away from the Autonomous City of Buenos Aires (CABA), greater conditions of vulnerability and precariousness are presented (PELM, 2005, De Sena, 2019). In this territory, the housing deficit (qualitative and quantitative) affects 331 420 households (Di Virgilio and Serrati, 2019) and the number of homes that present situations of qualitative deficit (expansion/improvements) is greater than the quantitative one (irrecoverable homes). Likewise, access to basic services and infrastructure of neighborhoods directly related to the habitability, health and quality of life of the population is unevenly presented in the territory where the best situations are in the first area and the worst in the second and third (De Sena and Bareiro Gardenal, 2019). In the massacre, 163 informal housing estates were registered (RENABAP, 2023).

The argumentative strategy of this article is structured as follows: the first section will develop a theoretical problematization and a background review on informal urbanizations. The next section will be devoted to some methodological clarifications, and then the analysis of the data will be presented. This analysis will be divided into two sections: first, a general description of La Matanza in relation to the housing problem; and then, a specific approach for each area, with the aim of deepening on the sensitivities related to the neighborhoods in each case.

A possible theoretical route to problematize about informal urbanizations

The urban is defined as "belonging or relative to the city and, by extension, to other population centers" (RAE, 2024). Classical authors such as

Lefebvre (2017), from a sociological and philosophical perspective, and Harvey (1977), from a perspective that incorporates the geographical and economic aspects, addressed urban problems, the notion of city and the right to the city, and the social inequalities associated with the planning and production of space. For Lefebvre (2017) it is essential to start from the concept of "living" since the city "is the form of this place of 'private' life" (p. 83). From this approach, we move from the particular to the general and highlight daily life, its rhythms, its occupations and its spatial-temporal organization. For Harvey (1977) "every general theory of the city has to relate, in some way, to the social processes in the city with the spatial form that the city assumes" (p. 6).

In terms of Cervio (2020), from a structural perspective on socio-spatial segregation and the intensification of poverty conditions, the policies of sensitivities, in their daily and unnoticed operation, "create a set of walls ("mental" and "concrete") around which cities are fragmented, leading to the emergence of a complex articulation of practices, experiences and conflicts" (p.138). Specifically, if we look at the sociospatial segmentations and segregations that occur in cities, we can see sectors populated by subjects who experience in their daily lives the fragility of this system which is precarious, clandestine and informal.

Following Lefebvre (2017) the phenomenon of segregation could be analyzed according to different criteria:

> Ecological (shantytowns, poor neighborhoods, rot of the heart of the city), formal (deterioration of the signs and meanings of the city, degradation of the urban by fragmentation of its architectural elements) or sociological (levels and ways of life, ethnicities, cultures and subcultures. (p. 116)

Segregation, which Lefebvre described in Paris in 1967, would tend to enhance its results in relation to preventing "protest, opposition, and action" as it scatters spatially who would once participate (the working class, according to the author).

In working class neighborhoods, according to Garnier (2015), sociabilities linked to work could be traced given the proximity between factories and homes, as well as participation in political and cultural expressions of resistance. The same author refers to the fact that one of the fundamental objectives of urban policy was to "expel the popular classes to the periphery and

organize their spatial dispersion" (Garnier, 2015, p. 39) from urban planning and real estate speculation. In this way, socio-economic marginalization was added to the socio-spatial marginalization.

In Argentina, following Cervio (2020), the prototypical territories of poverty and social vulnerability are the villages and informal settlements since the mid-20th century. According to Alcalá (2007), a progressive and uninterrupted process of illegal occupations began in both fiscal and private lands since the 1970s, originating the process of urbanization with the construction of a minimum precarious housing and the irregular subdivision of the land. The provision of infrastructure was first clandestine and then consolidation could be recorded from residential constructions that were regularized. These urbanizations were connected by some access road that allowed the connection and supply with the rest of the city. In worse cases, they were in areas vulnerable to flooding and pollution, along with lagoons, river edges, cobbles, dumpsites, etc.

Some of these settlements eventually began a process of land regularization and urban improvement that were slow and generally unfinished. In addition, according to the author in these processes:

> … roads with insufficient widths can be legalized both for the future extension of certain infrastructure and for the entry of vehicles, lots with widths and surfaces less than the regulatory one, lots without direct exit to public street, etc. For these reasons, although these processes represent a significant improvement in terms of legal security, it is difficult to guarantee that these neighborhoods can reach desirable urban and residential levels over time. (Alcalá, 2007, p. 45)

The author refers specifically to the case of the city of Resistencia in the province of Chaco, but considers that these situations are extensive to most Argentine cities and other countries in the south. In the case of Chile, taking the work of Campos-Knothe, (2025), informal settlements—known since the 1970s as "camps"—are characterized by a lack of access to services and by the occupation of areas exposed to environmental risks and disasters. The definition that the author takes based on the Ministry of Housing and Urbanism of Chile (MINVU) is the following:

> A camp is defined as a settlement of eight or more households living in substandard housing that is clustered together and adjoining, that do not have regular tenure of the land they occupy, and that lack at least one of the three

> basic services, i.e. drinking water, electricity and sewage. (Campos-Knothe, 2025, p.164)

In addition, according to data from the same ministry, between 2011 and 2020, camps in Chile grew by 22 %, equivalent to 145 new settlements in almost ten years (Campos-Knothe, 2025). The increase in informal urbanizations in recent years is a coincidence in several countries in Latin America and other continents such as Africa and Asia (UN-Habitat, 2022).[1] Following Kovacic (2022), who analyzes the cases of Brazil and South Africa, the persistence of informality can be linked to the social policies applied on "slums" (favelas) that do not lead to their decline, but produce new and adaptable forms of informality that tend to their reproduction.

Taking up Cervio (2020) "the social, economic, environmental and aesthetic impact that these urbanizations have on the urban fabric is undeniable, giving rise to different interventions by the State, as well as the real estate market" (p. 143). One of these interventions can be mentioned as the National Register of Popular Neighborhoods in the Process of Urban Integration (RENABAP), created in 2017 between the National State and various social organizations. From this first survey, the existence of more than 4000 popular neighborhoods throughout the country was detected and the Family Housing Certificate was also instituted as a sufficient document to prove the existence and veracity of the home, for the purposes of carrying out various procedures: requesting the connection of services such as running water, electricity, gas and sewers; requesting health, pension and educational benefits; making requests to public bodies; asking for the unique tax identification key and/or the unique labor identification key (Brizuela and Campana, 2020).

The survey keeps updating since its creation and there is a Manual for the conformation and updating of the National Register of Popular Neighborhoods (2023) that defines these as neighborhoods commonly called villas or settlements that were constituted through various land occupation strategies and that present different degrees of precariousness and overcrowding, a deficit in formal access to basic services and an irregular domain

1 According to UN-Habitat (2022) data, more than 1 billion people live in slums and informal settlements worldwide, but their prevalence is highest in three regions that are home to around 85 per cent: Central and South Asia (359 million), East and Southeast Asia (306 million) and Sub-Saharan Africa (230 million).

situation in land tenure. However, there are some differences in relation to these types of housing developments, for example, villas, which according to Herzer *et al.* (2008) are defined as vacant urban land occupations that produce irregular plots and following Cravino (2018) these are located in the central area, in the Federal Capital and the first ring of the Buenos Aires conurbation. This type of settlement dates back to the early 20th century and its urban configuration is characterized by irregular streets and narrow corridors. On the other hand, the settlements are located more towards the periphery, in areas of lower population density and are characterized by imitating formal urbanizations in terms of the dimensions of the lots and the urban grid (Cravino, 2018).

A central aspect that encompasses the two types of urbanizations is "the extension of informal markets in the ways of production of urban land and housing" (Fernández Wagner, 2015, p. 32). Social processes ranging from tenancy in the villages (Rodríguez *et al.,* 2018) to land territoriality to establish settlements (Clichevsky, 2012) occur under a spectrum of informality, i.e., without a formal legal framework and in conditions linked to precariousness, vulnerability and poverty.

Methodological clarifications

In order to carry out an analytical description of the informal urbanizations of La Matanza according to their general and specific characteristics of each area, this research uses qualitative primary data (semi-structured interviews) and quantitative secondary data (from RENABAP, 2023). We understand that these types of data are complementary and have the ability to be enhanced from a multi-method methodological strategy (De Sena, 2015) where different techniques and procedures are integrated on the same object of study to strengthen their reading and analysis.

Interviews were conducted in person to eight people from civil society organizations who carried out housing interventions in different neighborhoods of La Matanza between 2020 and 2023. These interviews focused on describing the role that CSOs have in housing issues, therefore, the dimensions that were addressed were: information about the interviewee, information about the organization and the link with the community – tasks, resources and strategies related to access to housing – links with other actors, emotions

related to the implementation of interventions for accessing to housing – how people who come to the organization feel, what they feel when intervening in the neighborhoods. Within this last dimension, descriptions were made about the neighborhoods where the organizations intervened, both in settlements and in villages of La Matanza. In some cases, the people who were part of these CSOs also inhabited these territories, in others they transited them by carrying out different activities that allowed them to know about these neighborhoods as external actors to them.

In other works, the role of CSOs in the network of actors that is formed around the housing problem was addressed (Bareiro Gardenal, 2023a) and also their practices and emotions (Bareiro Gardenal, 2023b; Faracce Macia and Bareiro Gardenal, 2025). Likewise, a distinction was made between those organizations internal to the neighborhoods (their creation and permanence is linked to the same territory where they carry out their activities and their members live there) and external to the neighborhoods (they have their headquarters in another place different from the territory where they carry out their interventions and their members do not live where they intervene). We use this distinction in this work to point out that some of the people interviewed live in the informal housing developments that they are going to describe and others "transit" them so that their living conditions are different. However, what we are interested in analyzing is how, from different perspectives, the informal urbanizations of La Matanza are described from the narratives of these two groups. Therefore, a matrix was made coding these interviews with respect to their descriptions of the slums of La Matanza in general and also according to area attending the CSO and whether the informant lived in the neighborhood or not.

In addition to this, a database was downloaded from the National Register of Popular Neighborhoods updated to 2023 that has the following variables: ID RENABAP, name of the neighborhood, number of families living in the neighborhood, year of creation of the neighborhood, decade of creation of the neighborhood, neighborhood typology (settlement, villa, degraded housing complex), domain situation, predominant situation on the connection to electricity, predominant situation on the connection to the water system, predominant situation on the connection to the gas system. The original base had information about the municipalities and departments of all the provinces of Argentina, but was leaked by those belonging to La Matanza, Buenos

Aires.[2] To complement the information regarding the localities and to be able to deepen on the differences in the areas, information was added from the map.poblaciones.org[3] portal in which different maps possible to modify according to the chosen indicators are accessed and visualized, in this case the data from RENABAP (2023) are also used for its elaboration.[4]

Informal settlements in La Matanza, between homogeneities and heterogeneities

Below, we present some data that allow us to characterize the informal urbanizations in La Matanza. According to the data of Mapa Poblaciones based on RENABAP (2023), there are 163 neighborhoods distributed within the 16 localities of the district with a total of 65,132 families living in them. Likewise, the type of informal urbanization is distributed as follows: 50 are classified as villas, 110 as settlements and three as a degraded housing complex (map 1). And taking into account map 2, one aspect that can be observed is that in the area of the first settlement most are distributed as villas (red color) while settlements predominate in the second and third (in violet and light blue the three referred to as "degraded housing complex"), giving an account of a differentiated distribution with respect to the type of urbanization, the settlement and the location.

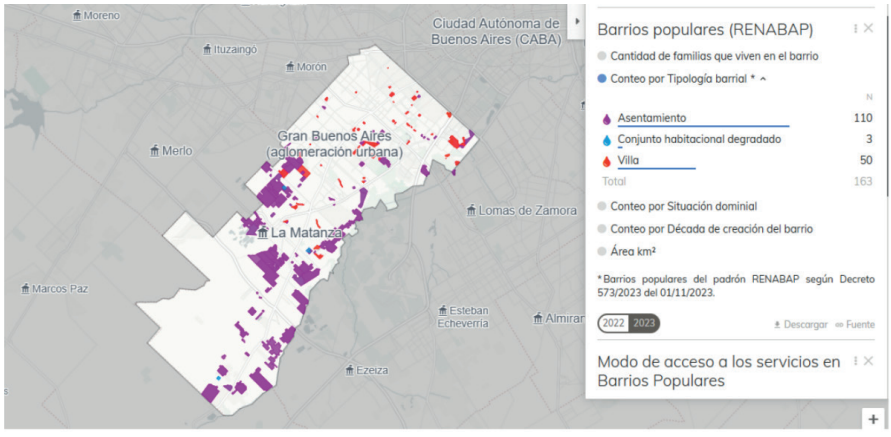
2 On this basis the total neighborhood is 158.

3 Georeferencing and characterization of Popular Neighborhoods officially registered in RENABAP. Villas and settlements with a minimum of eight families grouped or adjoining, where more than half of its inhabitants do not have land title, nor formal access to at least two of the basic services (running water, electricity and/or sewage network) (Source: https://mapa.poblaciones.org/map/191801

4 On this basis the total number of neighborhoods is 163.

Map 1

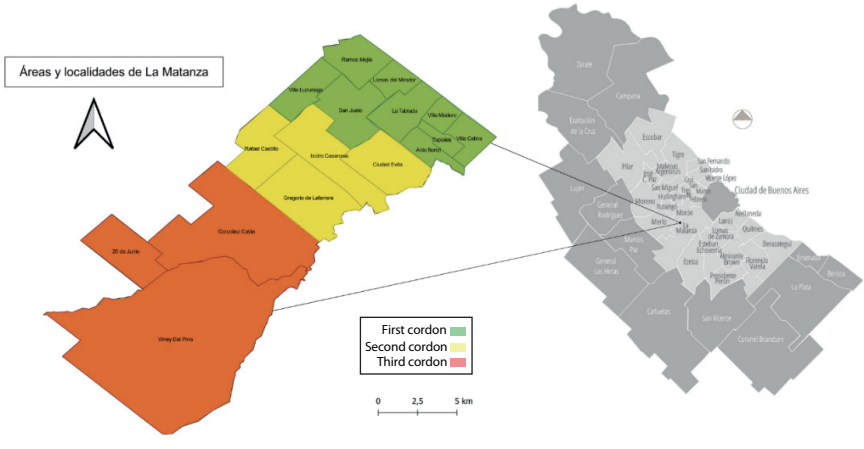
Type of informal urbanization in La Matanza



Note. National Register of Popular Neighborhoods (RANABAP, 2023).[5]

Map 2

Areas and localities of La Matanza within the Metropolitan Region of Buenos Aires



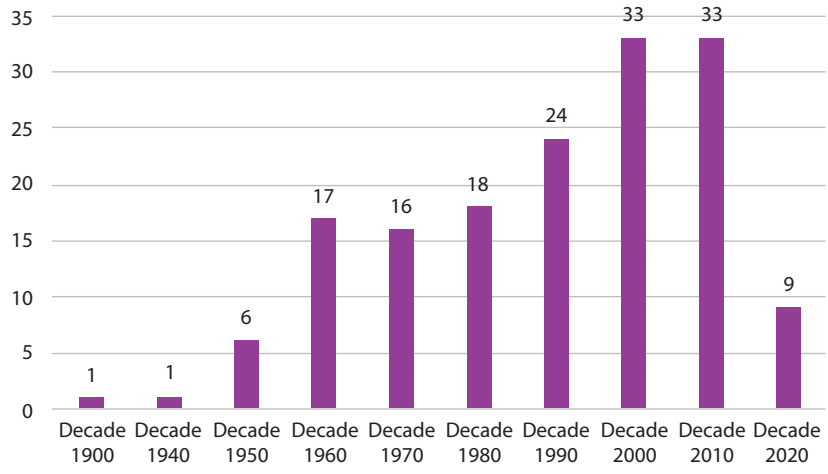
5 https://mapa.poblaciones.org/map/191801

As seen in the theoretical section, there are some differences in terms of the morphology of these types of urbanizations, but they also account for different socio-historical plots that link the conformation of the spatial and territorial with the social processes that take place there. From the qualitative approach, this distinction was reflected in the narratives of the interviews at the time of describing what problems linked to housing they detect in La Matanza. First, they draw some boundaries and borders between the first, second and third settlements:

> There I would make a distinction … from settlement one, i.e., from Route 4 for General Paz there are lots of villas, maybe covering one block … and from there to the bottom, from Laferrere to Cañuelas, there are slums; first they were slums and then settlements. It is a general feature; it does not mean that there are no exceptions; maybe in Laferrere you will find a little village just like here. But in general, the villas are up to Casanova because in Casanova there is the Sanpete *(Villa "Saint Petersburg")*. From Casanova to General Paz, it is common to find villas. De Laferrere for the for the 35, 38, 40 *(kilometers of the Route 3)* are slums and settlements. This is a general characteristic, but it does not mean that everything is like that (OSC1, male, non-resident of an informal housing estate)

In other works (Bareiro Gardenal, 2023c) we have addressed the problem of land tenure and the creation of new informal settlements in La Matanza in the context of the COVID-19 pandemic in the years 2020 and 2021. In this particular context, the health emergency—along with the food, housing and other emergencies—worsened the risky and precarious situation by adding the difficulty of complying with the slogans such as "stay at home" and "wash your hands with soap and water", understanding that these territories lack basic services or are inefficient, in addition to the fact that they are overcrowded. Therefore, regarding the date of creation of the neighborhood, nine were created in the 2020s while most (66) have a date of creation between the 2000s and the 2010s. Likewise, 24 neighborhoods were created in the 1990s, there were 18 in the 80s, there were 16 in the 70s, there were 17 in the 60s and the remaining eight between 1900 and 1950 (figure 1).

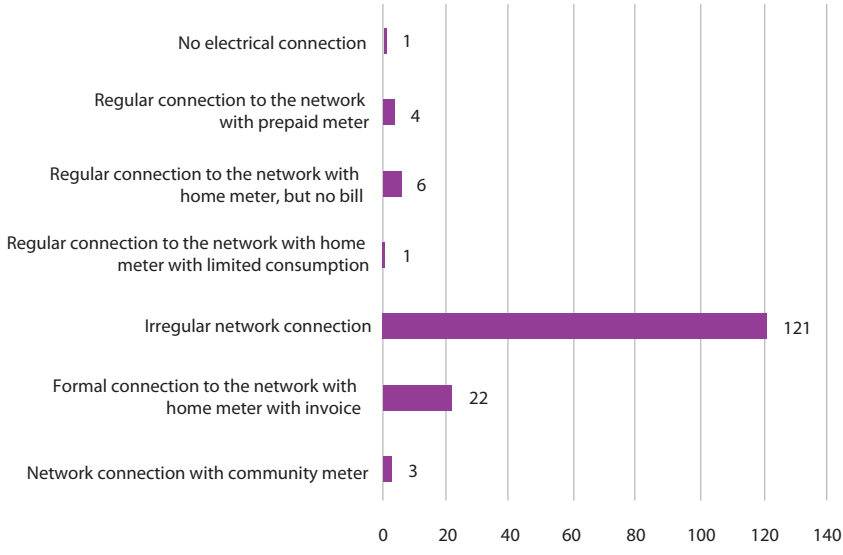
Figure 1
Decade of neighborhood creation



Note. National Register of Popular Neighborhoods (RANABAP, 2023).

Given that access to land occurs informally and is linked to population poverty, lack of employment and/or labor informality, as well as low wages (Clichevsky, 2012), these lands are not urbanized or, if so, present precarious conditions (Alcalá, 2007). In this way, the structure on which those who live in these territories are based is predominantly the connection of irregular services, which presents risks with regard to living conditions. Figure 2 shows that most neighborhoods (121) have an irregular electricity connection, one has no connection, and 22 have a formal connection with a meter. Of the connections considered 'regular', six are home meters without invoice, four are pre-paid meters, three are community meters and one is a home meter with limited consumption.

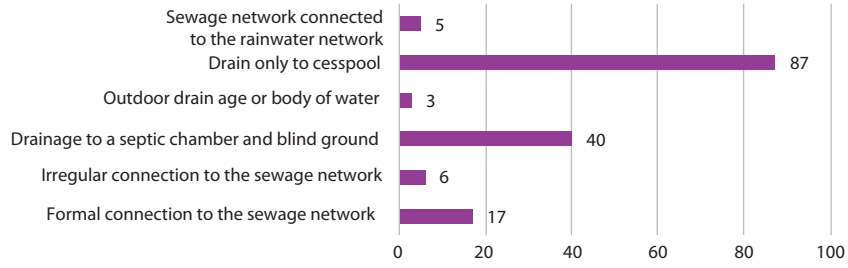
Figure 2
Prevailing situation on electricity connection



Note. National Register of Popular Neighborhoods (RANABAP, 2023).

In relation to the sewage network, we observe different types of precarious and/or irregular connections as it happens with the electricity network. In general, the drain to cesspool predominates (87) followed by the septic chamber and well drain (40). There are also irregular connections to the sewage network (6) and formal connections (17). There are five neighborhoods that connect the sewage network to the storm network (i.e., the network that drains rainwater) and three leave their drains outdoors or to a body of water.

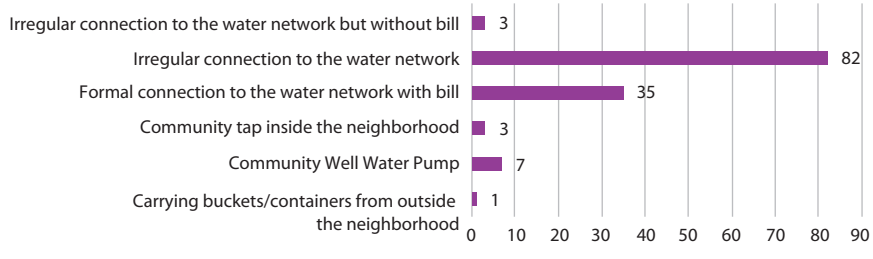
Figure 3
Prevailing situation on sewage connection



Note. National Register of Popular Neighborhoods (RANABAP, 2023).

In addition to the connection to electricity and the sewage network, water is an indicator that is directly linked to the health of the population and as shown in figure 4. It is generally accessed irregularly (82 neighborhoods) while 35 have a formal connection with a bill, three do so without a bill and the others resort to other community modalities (tap inside the neighborhood, community well water pump) and outside the neighborhood (carrying buckets/containers).

Figure 4
Prevailing status of connection to the water network

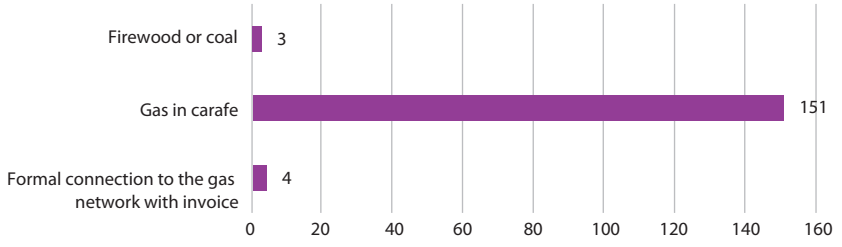


Note. National Register of Popular Neighborhoods (RANABAP, 2023).

In the case of gas, this is predominantly achieved from the purchase of carafes (Figure 5). In this case, it must be considered the high price of the packaged gas, the quantity required to be purchased per month and the risks

associated with its use.[6] Only four neighborhoods have access to the gas grid with electricity bills and three use firewood or coal.

Figure 5
Prevailing situation on gas grid connection



Note. National Register of Popular Neighborhoods (RANABAP, 2023).

As reviewed in De Sena (2020), access to basic services and other indicators of habitability such as overcrowding, as well as socioeconomic status, education, health and employment, worsen from the first to the second and third settlement of La Matanza. An index developed by the author on basic living conditions, which includes the aforementioned variables, identifies that in the first settlement most (69.7 %) do have basic living conditions, but this changes in the second and third slum, in which the population represents almost half (47.8 and 44.1 % respectively). Regarding the localities where those who do not have the basic conditions are located, González Catán stands out with 30.4 %, Rafael Castillo with 34.8 %, Ciudad Evita with 13 %, Gregorio de Laferrere with 4.3 %, Ramos Mejía with 4.3 % and San Justo with 4.3 %. This gives an account of some heterogeneities.

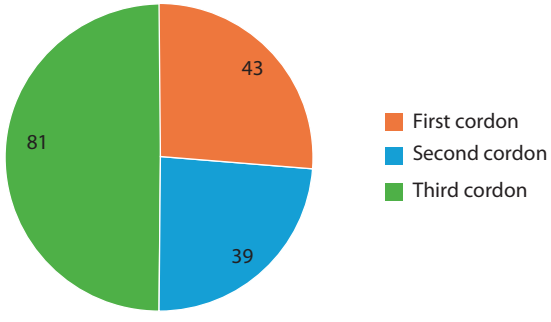
As mentioned above, there are some traits in the characterization of informal housing estates according to the slum and according to the locality. Most of the informal settlements are located in the third slum with 81, followed by the first slum with 43 and the second with 39 (figure 6). If we look at what happens according to localities, following figure 7, González Catán and Virrey del Pino are the ones that nucleate the majority with 44 and 37 respec-

6 Reference prices for 2024 (in Argentine pesos) are: 10 kg carafe: $10 500, 12 kg carafe: $12 600, 15 kg carafe: $15 750 (Resolution 216/2024) https://bit.ly/40TnQ6n More information at: https://bit.ly/40BelqX

tively and both are part of the third slum. However, the locality that follows in quantity is Rafael Castillo with 16 and this is from the second slum. They continue in order San Justo (11), Gregorio de Laferrere (9), Isidro Casanova (8), La Tablada (7), Villa Celina (7), Ciudad Evita (6), Lomas del Mirador (5), Tapiales (5), Villa Luzuriaga (3), Ciudad Madero (3) and Aldo Bonzi (1).

Figure 6

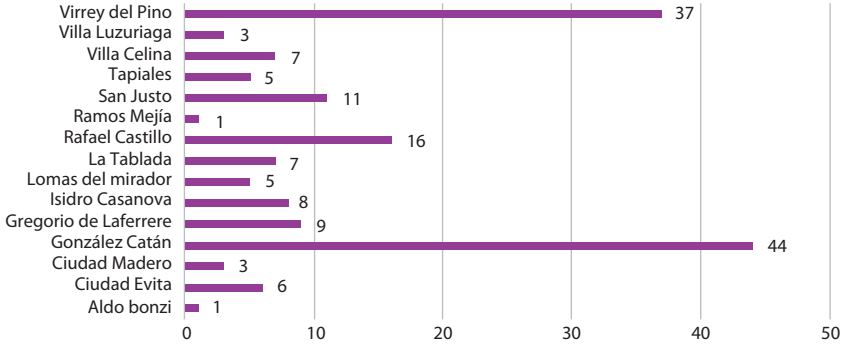
Informal housing estates according to La Matanza



Note. National Register of Popular Neighborhoods (RANABAP, 2023).

Figure 7

Informal housing estates by location



Note. National Register of Popular Neighborhoods (RANABAP, 2023).

In what follows, we will focus on qualitative data to establish connections between the sensitivities that emerge around the housing problem linked to the different informal urbanizations of each slum of La Matanza. In each case, we will review the description of the subjects interviewed about the following aspects: the origin of the neighborhood, the infrastructure of the neighborhood and access to basic services.

First cord

The localities that make up the first slum extend, some of them, along General Paz Avenue, which is one of the first borders indicated to divide —materially and symbolically— the Autonomous City of Buenos Aires (CABA) with the areas that make up its conurbation and belong to the province of Buenos Aires, as is the case of La Matanza. Its proximity to CABA establishes certain socio-historical structures because they were the first territories to begin to urbanize as the urban fabric begins to expand throughout the 20th century. They were also the first places where the emergency villages that were in the Federal Capital were relocated, within the framework of an eradication policy that begins in the late 60s and continues during the 70s and 80s (Oszlak, 2017; Moreno, 2002).

In the following interview fragment, the notion of Transient Housing Nuclei (NHT) that were built within the framework of these eradication plans is highlighted. Specifically in the period 1968 to 1971 a total of 83 villages with 35 691 people were eradicated in the period 1968 to 1971, of which 25 052 were housed in the NHT. These were transformed into permanent residences, housing that had a high precariousness of materials and construction systems (Yujnovsky, 1984). Some were located in the first slum of La Matanza:

> When the dictatorship arrives, it takes a series of measures… that took people out of the capital city and sent them here, to La Matanza to the transient housing centers such as Puerta de Hierro, Palito… I don't know if I have forgotten any… They took them out and sent them here with the promise that they were transient and were eternal. Today it has been more than 50 years, so we also say that it is a debt of our democracy to the land and housing because we failed in democracy to give a solution to the large housing deficit that has the province of Buenos Aires and the country. (OSC1, male, non-resident of an informal housing estate)

Not all the villages in this area started as NHT but there are different origins. In addition to the Av. Gen. Paz, another of the borders that delimits the spaces is the Provincial Route N°4, colloquially called "Camino de Cintura" since it crosses several municipalities of the Buenos Aires conurbation and also divides some localities of the first slum with those of the second slum. On this route are located some of the villas present in the area and also on Av. Crovara, across to the first.

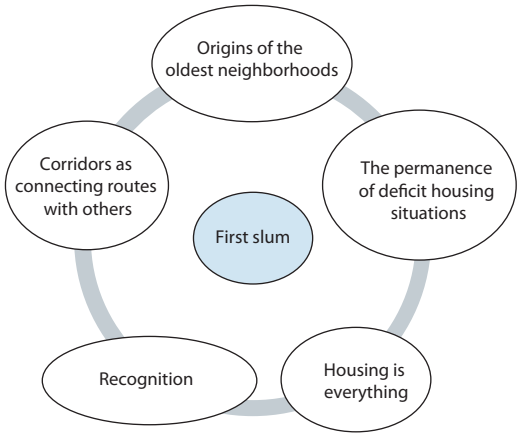
> I live in Aldo Bonzi, just over Camino de Cintura, i.e., Route 4; there are four aisles, it is like a T. We now know our corridors and how we are part of the territory through the national survey of popular neighborhoods. We didn't exist, we were a point, i.e., we didn't exist in the GPS, we didn't exist in the maps, we didn't exist anywhere... it was a field. We were green. Today I know that the corridor in my house is like this, I know how many people live in each of the corridors. (OSC4, Male, inhabitant of a village of the first cordon)

In the previous fragment, some sensitivities associated with the recognition by the State from a social policy that in turn allows to have greater knowledge about the territory in which they live: the corridors of the village, its corridors. Other emotions linked to the house as a place that structures and organizes daily life are described below:

> As I told you, I have a house, it is small, we do not have gas because there is no gas; there is no gas in the villas in general nor in many formal neighborhoods... I have an electric thermotank at home, which I connect… I built my house, and I did it step by step, and now there are things that I want to change and I save money... for me the house is a lot, it is everything, is... where I live, where I eat, the house is part of us... it is our habitat. (OSC4, Male, inhabitant of a village of the first cordon)

From this qualitative approach, we can link some structural issues characteristic of this area and linked to each other: the historical origin of the villas that were formed there, the recognition of these territories, but still the absence of some basic services, the claim for the permanence of precariousness, the housing deficit and the notion of house and the corridors of the villa as the ways of connection with others (Figure 1).

Figure 1
Sensitivities associated with the informal urbanizations of the first slum of La Matanza



Second slum

We review in the previous sections that the area of the second and third slum is characterized by having more informal settlements and land tenures. According to Gusfield (2014), the policy in the late 90s and early new century in relation to informal settlements begins to change perspective moving from eradication to regulation, informal urbanizations begin to densify and extend to the peripheries. In these places, the experiences of self-construction as interstitial spaces stand out. Although they do not subvert the naturalized/naturalizing social order, their power lies in offering/building a collective opportunity to think about alternative ways of the social where affectivity is a central node (Cervio, 2018).

> All the neighbors that are here are because of settlements since (*year*) 86 imagine… they lived in assemblies helping neighbors of the neighborhoods that they created afterwards… they supplied themselves, they installed their own meter… they bought the meters, did everything regarding water… imagine and afterwards the municipality wants to take out what is yours… is the worst thing they could do. The neighbors always remember that in 2000 they armed each other to defend and protect what they have installed...

E. And why did they want them out?

> Because they wanted to put it for another neighborhood … but as they told the people from the municipality, we paid for it and if you remove it you are affecting us. And it is the only phase we have here, the only meter that is inside the neighborhood... (OSC6, woman, inhabitant of a settlement of the second slum)

The above fragment can also be related to sensitivities linked to certain trust-distrust schemes towards one another, the neighbors, the municipality. Cervio and De Sena (2017) pointed out that, for a long time, many of the interactions that take place in cities have been built largely from distrust, i.e., supported by the construction of the other (anonymous, unknown) as a threat or, at least, as "possessor/deserving" of a limited reliability. This can also be analyzed in the following fragment linked to the infrastructure of the neighborhood:

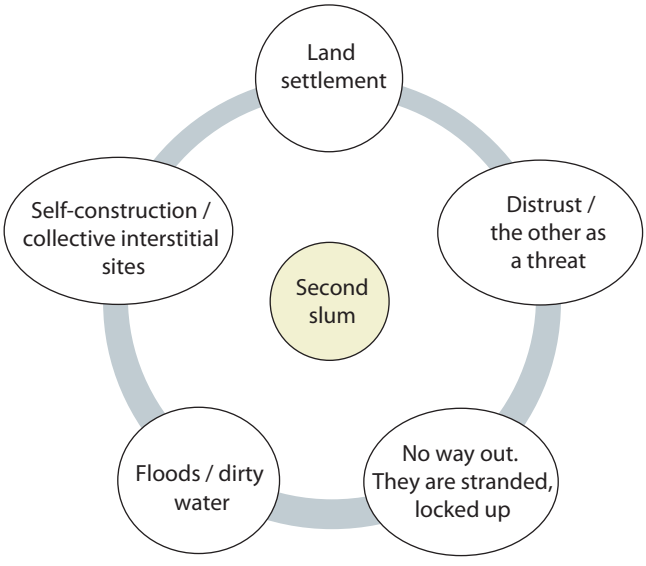
> In the neighborhood when it rains, we can not leave … we have told the municipality and to this day we do not have an answer. (…) we are stranded here, I can't take him to school because it floods, you can't go to the hospital if there is an urgency, we don't have buses, so we don't have another way out. (OSC6, woman, inhabitant of a settlement of the second slum)

"To be stranded" refers to being stopped or stuck in time (RAE, 2024), in this sense the link between time and space and the organization of life based on these structural parameters is no less (Giddens, 2003). The "mental and concrete" walls (Cervio, 2020) are becoming increasingly evident in this habitat linked to lack, to the "worlds of no" (Scribano and De Sena, 2016) in the infrastructure of the neighborhood and in access to an essential resource such as water:

> We do not have water now… there Is a little at dawn, then it no longer comes out and all day we have no water and that's it, I presented, but to this day we do not have an answer to that problem of water … and is stagnant, then when the water comes It comes all dirty. (OSC6, woman, inhabitant of a settlement of the second slum)

In this way, the sensitivities associated with the informal urbanizations of the second slum have connections with some issues different from those of the first, as shown in Figure 2.

Figure 2
Sensitivities associated with the informal urbanizations of the second slum of La Matanza



Third slum

In coincidence with the informal urbanizations of the second slum, in this area the beginning of the neighborhood is also located from a settlement but in this case since the 1990s. There are also collective social practices that were formed to push the limits imposed on the "worlds of rejections". These practices activate the recovery of the capacity to do with others and for others in nearby spaces (Cervio, 2018).

> I've lived here in the neighborhood for 30 years. I tell you that this was a slum, so there was nothing, and... and well, with the same neighbors we started to see the need we had, we had no buses, we had no lighting, we had no street, we had no sidewalk. So we decided to set up the neighborhood board. Uh... the neighborhood board starts working through the statute rethinking what our need was and well, changing our quality of life. And through that we can achieve asphalt, which is lighting, sidewalk projects, among other things. We help

> others. If they call us and they have the resources and the materials, we go and accompany them. (OSC2, woman, inhabitant of a settlement of the third slum)

While there are some homogeneities that link most informal housing estates as the unsafe/irregular connection to basic services in the third slum, there are certain heterogeneities in this area that are important to mention. The first relates to the remoteness of the territory:

> In a neighborhood of Virrey del Pino that is called the last slum of the conurbation because it is really very far, and is one of the most forgotten, then that is where we always felt that we had to help more (...) signatures were gathered to claim for the light in a neighborhood and people did not even notice, it is frustrating. (OSC3, male, non-inhabitant of an informal urbanization)

Sensitivities linked to the "distant" have both a spatial and a temporal implication. It is far a point (a) in relation to another point/s (b, c, d, e, f, etc.) and that movement from one side to another carries greater bodily, mental, emotional energies. Scribano (2010) describes capitalism as a great energy predatory machine that consists in the appropriation of all forms of energy, involving the dispossession of common goods (related to the environmental) such as water, air and land, as well as bodily energies. This predatory process "does not consist in the mere alienation of goods, resources and energies, but in destruction and death" (Scribano and De Sena, 2013, p. 211).

The latter gives rise to another difference that, for the moment, could be captured in the descriptions made about the third slum, the imminent catastrophes as a result of occupying places that involve risks when settling on them – wetlands, streams, coasts – and/or that are environmentally degraded – garbage dumps, contaminated lands, fumigated –.

> There was a very important flood in several neighborhoods of La Matanza in October 2019 and in Nicole *(settlement located in Virrey del Pino)*. It was tremendous because the neighborhood grew up in such a way that today the Morales Creek is in the bottom and there are homes that occupy an area that should not be occupied because if the creek grows it floods and well, it is occupied and many of those homes were flooded and they lost everything. (OSC5, female, non-resident of an informal housing estate)

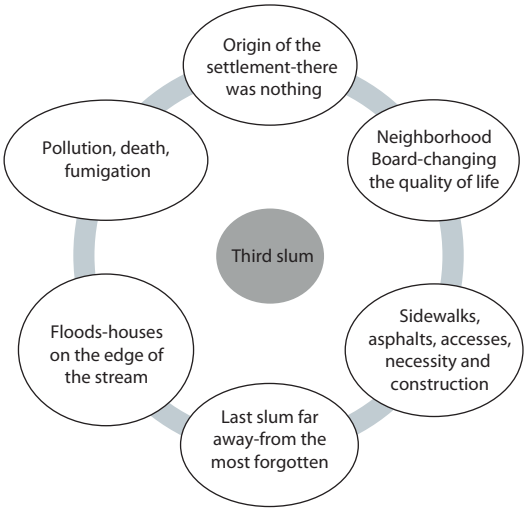
In this sense, one more factor is added to the sensitivities associated with these informal urbanizations. Proximity to pollution and potential for death (Figure 3).

We accompany the issue of pollution *-company name-*, we have had several meetings in La Plata… several meetings …. with OPDS … the last meeting was just pre-pandemic with the *-company name* lawyers, because they say they do not pollute, but most people there have died of cancer, i.e., there is pollution.

E: And are there neighborhoods around?

There is a neighborhood that is prior to the installation of the company. Did you see? And now there is glyphosate contamination at the bottom of (*neighborhood*) Nicole also because there are… there are several large acres with soybean planting and they are spraying with glyphosate. So that's a pretty hunchback problem, too. (OSC1, male, non-resident of an informal housing estate)

Figure 3
Sensitivities associated with the informal housing estates of the third slum of La Matanza



Conclusions

This article aimed to describe and analyze the informal urbanizations of La Matanza distinguishing the characteristics they present in each area or slum

in which this territory is segmented. In this way, both qualitative and quantitative data were observed, homogeneities (deficit infrastructure of neighborhoods, irregularity in services and land domain) and heterogeneities (origin of neighborhoods, differences between villages/settlements, problems related to the environment such as pollution, floods, degraded territories).

Another objective was to link the informal urbanizations of each slum to some sensitivities as cognitive-affective practices that organize daily life, order preferences and values, establish parameters for the management of time/space (Scribano and De Sena, 2019). The habitation (sensu Lefebvre) in these territories where vulnerability, irregularity, lack and risk predominate, becomes increasingly difficult as other "walls" that establish coagulated temporal and spatial rhythms, i.e., increasingly dense and heavy to sustain, are added.

The villas of the first slum could be associated with the permanence of the deficit housing situations as "unless if" (Scribano, 2010) but at the same time there is a plot related to "recognizing" that they exist (the corridors of the villas, the housing, the housing deficit). On the other hand, in the informal settlements of the second and third slum, there is something related to being forgotten, to being far away, to being "stranded", to the lack of response. These sensitivities are woven around interstitial spaces that allow collective practices (neighborhood meetings, assemblies, self-construction, self-management of resources) but also insecurity, threat and distrust of other social actors (State, companies, organizations, other neighbors).

There are still many spaces to continue exploring in relation to these territories, their emotions and sensitivities. In terms of Lindón (2009) the transversalities and analytical intersections between the body, emotions, the city and spatiality from the perspectives of the inhabitants result in a powerful mechanism for understanding social processes. In future works, it is expected to continue to address, from the qualitative, the perspectives of the inhabitant subject with its corporeality and emotionality in relation to the housing problem of La Matanza.

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Florencia Bareiro Gardenal	Roles: conceptualization, methodology, software, validation, formal analysis, research, resources, data curation, original draft-writing, review-writing and editing, visualization, supervision, project management, fund acquisition.

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Generational classification and digital competencies in professional communication: an analysis from the technological approach

Clasificación generacional y competencias digitales en la comunicación profesional: un análisis desde el enfoque tecnológico

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Abstract
Digital competence, understood as the ability to use information and communication technologies (ICT) for effective interaction, is essential in the contemporary professional context. This study examines the relationship between age and digital competencies across different generations, emphasizing key areas such as communication, collaboration, and digital content creation. Based on the Common Framework of the National Institute of Educational Technology and Teacher Training (INTEF), the research was conducted in an Ecuadorian setting and adopted a quantitative approach. Data were collected and analyzed from 193 professionals, highlighting the generational influence on the adoption of technological tools for effective communication. The results indicate that although age is not a determining factor in general digital skills, significant generational differences exist in content creation and digital interaction. This study underscores the importance of continuous training in technological skills, particularly in areas related to communication and professional collaboration.

Keywords
Digital competence, taxonomy, generations, training, technology, level of knowledge, Ecuador, education.

Resumen
La competencia digital, entendida como la capacidad de utilizar tecnologías de información y comunicación (TIC) para la interacción efectiva, es esencial en el contexto profesional contemporáneo. Este estudio examina la relación entre la edad y las competencias digitales de diferentes generaciones, con énfasis en áreas clave como comunicación, colaboración y creación de contenido digital. Basado en el Marco Común del Instituto Nacional de Tecnología Educativa y Formación del Profesorado (INTEF), la investigación se llevó a cabo en un entorno ecuatoriano y adopta un enfoque cuantitativo. Se recolectaron y analizaron datos de 193 profesionales, que destaca la influencia generacional en la adopción de herramientas tecnológicas para la comunicación efectiva. Los resultados indican que, si bien la edad no es un factor determinante en las habilidades digitales generales, existen diferencias generacionales significativas en la creación de contenido y la interacción digital. Este estudio subraya la importancia de la formación continua en habilidades tecnológicas, especialmente en áreas relacionadas con la comunicación y colaboración profesional.

Palabras clave
Competencia digital, taxonomía, generaciones, formación, tecnología, nivel de conocimientos, Ecuador, educación.

Introduction

Digital competence has become a skill for both students and teachers, who must acquire digital knowledge to adapt to the demands of society and provide quality education (Orakova *et al.,* 2024). Alvarez-Flores *et al.* (2017) affirm that ICT helps traditional models to be more flexible and participatory.

This means knowing how to use digital tools and integrate them in teaching and in virtual environments that promote collaborative learning. The study focuses on examining the relationship between age, in terms of generations and the level of digital competence in five areas established by INTEF. A questionnaire was applied to 193 high school teachers in various Loja educational institutions in Ecuador. The aim is to understand how the age of teachers can influence their ability to develop digital skills in an increasingly digitized educational environment.

Importance of digital competence in education

The integration of Digital Competence (DC) in teacher training is essential to adapt to professional roles in the digital age (Tejada-Fernández and Pozos-Pérez, 2018). Digital Teaching Competence (DLC) is crucial both in the professional field and in everyday life. Throughout this study, we will use 'DC' to refer to Digital Competence, and 'DC' for Teaching Digital Competence. Alvarez-Flores *et al.* (2017) mention the e-Skills initiative, which seeks to raise awareness about the safe use of technology, promoting interest in technological disciplines and offering ICT training opportunities for the reinsertion of unemployed people into the labor market.

Padilla *et al.* (2019) underline their importance in the education system and the need for effective integration of ICT in the classroom. It refers to the Common Framework of Teaching Digital Competence (CDCF) and highlights that there is a low level of DC among the teachers evaluated. It identifies an interest in teachers in receiving training to improve their skills in the use of ICT. The MCCDD establishes three levels in each DC: basic, intermediate and advanced (INTEF, 2022), which provides a framework for the training and evaluation of teachers in this field.

Garzón Artacho *et al.* (2020) emphasize that DTC is fundamental in continuous learning and emphasize that addressing the teacher deficit in various digital dimensions is a current educational challenge. Their study reveals a direct correlation between previous ICT training and the dimensions of communication, collaboration and content creation, indicating that teachers with a more solid ICT training tend to show superior skills in these areas. They noted that a gap in digital content creation persists, underscoring the need to strengthen digital content training and address gaps in various digital di-

mensions. It highlights the urgency of improving the digital DC of teachers through training and effective training in the use of ICT.

The study by Marín-Suelves *et al.* (2019) focuses on working the DC of postgraduate professors in a transversal way during an academic year. An increase in the perception of the participants was observed. This highlights the relevance of integrating DC in teacher training, since digital skills training has a positive impact on their professional development. The approach of Domingo-Coscolla *et al.* (2020) highlights the need to prioritize its development and recognizes that digital technologies are becoming increasingly relevant in educational practice. Garcia-Ruiz *et al.* (2023) affirm that the Digital Teaching Competence (DTC) is key among teachers and guarantees success in teaching quality.

Socio-demographic factors and digital competence

These factors play a crucial role in determining DC as it encompasses a wide range of skills, such as competencies in Information and Communication Technologies (ICT), pedagogical competencies for ICT integration, curriculum knowledge and evaluation, ICT in education policy and leadership, professional development, digital citizenship, lifelong learning (UNESCO, 2019). Factors such as age, sex, years of experience, academic training, access to technology, among others, can influence people's DC achievement. Asang Mañay (2018) found in his study an inverse relationship between age and DC among professors, indicating that older professors tend to have lower levels of digital competence. Another study reveals that "older professors have not received specific training in digital technologies (DT) in their initial training" (Garcia i Grau *et al.,* 2022, p. 48). Academic training plays an important role, as teachers who have received an education that emphasizes the use of digital technologies in teaching are more likely to possess a more advanced DC. Padilla-Escobedo and Ayala Jiménez (2021) mention that a high percentage of professors, supported by their solid professional training, consider this competence as very important in the development of their subjects. González-Sanmamed *et al.* (2020) refer to the fact that the field of study to which a university professor belongs has a significant impact on his use of technological tools for professional development in the framework of the Learning Ecologies.

More experienced professors may have more opportunities to integrate digital technologies into their teaching practice and gain skills over time (UNESCO, 2020). Access to technological resources can facilitate the de-

velopment of the DTC, as it gives them the opportunity to explore, practice and experiment with different digital tools and resources. Martín Fernández *et al.* (2022) affirm that Web 2.0 tools have simplified access to high-quality educational resources in the educational environment, allowing the selection, organization, integration and connections of those that best fit the teaching practice, thus promoting the creation of knowledge in a collaborative way. It is important to promote policies that increase access to the Internet and multimedia in educational institutions (Flores Cueto *et al.,* 2020).

Teachers who have access to digital technologies and can use them regularly are more likely to develop the skills and knowledge needed to integrate them effectively into their teaching practice. Teachers who lack access to digital technologies may struggle to develop digital competence. But Padilla-Escobedo and Ayala Jiménez (2021) highlight that the mere use of ICT in the teaching-learning process is insufficient to promote changes in formal education. The digital gender gap in the initial training of future teachers in the educational context also marks significant differences in the areas of communication and collaboration, digital content creation and problem solving, in which men scored higher than women (Fernández-Sánchez and Silva-Quiroz, 2022). This digital gap is linked to the difficulties of using and accessing technology, which affect both individuals and institutions. Berrío Zapata *et al.* (2017) indicate that Internet access has become more common, differences in access to and use of the Internet still persist due to socio-economic and cultural conditions, posing additional challenges in the fight against digital exclusion.

Influence of generational taxonomy on teachers' digital competence

DC is known as a key factor for implementing innovative teaching and learning processes through the use of information and communication technologies at all levels, ages and educational settings (Mariscal-Vega *et al.,* 2021). Different factors can influence their use, one of them is the age of teachers. Amaro-Agudo *et al.* (2020) remind us that competences were born in the world of work and are related to the skills of a worker in his daily work.

In order to better understand how age affects the digital competence of teachers, attitudes towards technology of each generation were analyzed. The concept of generation is used to describe groups of people with similar

characteristics and behaviors. As the characteristics of life change, so does behavior. This can create a generational gap, where ideas do not always coincide with current reality (García-Ayala, 2017).

Table 1 shows a comparison between the characteristics of the four generations regarding their technological development (Ricaurte and Ortega, 2013). The limit years may vary, depending on the different authors (Cataldi and Dominighini, 2015).

Table 1

Generations and their technological evolution

Generation	Baby Boomers (1946–64)	X (1965–1980)	Y (1981–1995)	Z (1996 -->)
TECHNOLOGICAL DEVELOPMENT	Disk Phone, Radio, Cinema, Acetate disks, Polaroid camera, Early computers.	TV, Cable TV, VCR, PC, Atari, Cellphone, Walkman, TFT, ARPAnet, Advanced Research Projects Agency Network, Ethernet (LAN) Technology Development	Keyphone, Beeper, Nintendo, PlayStation DC, DVD, Laptop, MTV, Nickelodeon, Discman, Mp3, WWW, Yahoo!, Hotmail, Internet, Windows, Email, Chat, Web Cam, USB	Digital cameras, 3D TV, Google, Wikipedia, YouTube, Cellphones, GPS, Web 2.0 and 3.0, Videochats, Social networks, PSP, Wii, IPod, iPhone, SMS, Tablets, Gmail, Bluetooth, Wireless, Wireless routers

Note. A synthesis of the technological evolution that outlines the differentiation between the four generations is presented. Adapted from *Practices of Digital Generation in Mexico* (p. 17), by Ricaurte, 2013, Tecnológico de Monterrey. https://bit.ly/3RRVYv8

In Table 1 it is observed that experiences and exposures to technology vary according to the generation: The "Baby Boomers", born between 1946 and 1964 (Angeles, 2016), have experienced a gradual transition to digital technology; in terms of education "they are attached to the tradition and it is difficult for them to break the paradigms that they acquired many years ago, therefore the use and management of ICT is difficult for them and the young people of the new generations do not achieve technological empathy with them" (García-Flores *et al.,* 2016, p. 136). While the "Generation X", born between 1965 and 1980, has witnessed the expansion of digital technologies in its adult life. Harari *et al.* (2022) mention that, despite being more conservative in education, they show a willingness to work from home. In the educational field, this generation normally use ICT, although a small part also uses printed information (García-Flores *et al.,* 2016, p.138).

According to Delgado-Velesaca *et al.* (2020), the educational systems have teachers of diverse generations, the majority of them belonging to the Baby Boomers and Generation X. These groups were characterized by their early exposure to rudimentary technologies at a time when the world was experimenting with basic technology that led to future advances. Regarding the educational characteristics of "Millennials" or "generation Y", born between 1981 and 1996, Cadena Miranda *et al.* (2020), mention that they have grown up immersed in technology and are considered digital natives. Garcia-Flores *et al*. (2016) highlight that this generation is highly connected to ICT and can quickly access educational information locally and globally. Their ability to search for information on a subject taught by a teacher of the Baby Boomer generation is so quick that the teacher may fall behind in the search for information. "Generation Z", those born between 1995-2012, have been exposed to ICT for longer than any previous generation (Fernández Pérez, 2021), according to Jiménez-Macías *et al.* (2020) This generation uses technology since they were born, and they apply it in their daily lives.

By contrasting the studies mentioned at the beginning with the generations and their characteristics, the behavior of each group in the digital context could be better understood. However, it is important to consider these results from a critical approach since digital teaching competence is a complex construct that encompasses multiple dimensions and skills. Not only do digital technologies offer many new opportunities and present certain challenges, but they are also becoming essential to be able to form a relevant part of the knowledge society and economy in the 21st century (INTEF, 2022). It should be noted that age analysis may be insufficient to fully understand the influence of socio-demographic factors on the level of digital competence.

Materials and method

The research presented uses a quantitative approach, not experimental, with a transactional design (Hernández-Sampieri and Mendoza Torres, 2018). Its main objective is to examine the relationship between age and the level of digital competence in teachers who teach in public and private educational institutions in the city of Loja, and knowledge is assessed in the five competence areas defined by the common framework of teaching digital competence (INTEF, 2022). Different technological resources were applied to facilitate and

contribute to the documentary research process (Gregorio Rojas, 2023). Field research was developed, whose purpose was to collect and analyze numerical data, since the process of localization, selection and evaluation of an instrument is crucial to ensure the quality of the data collected and the validity of the study results (Creswell, 2012). An online survey was used to collect data and a descriptive statistical analysis was performed. Correlational research was carried out that included a regression analysis to examine the relationship between digital teaching competence (basic, intermediate or advanced) and sociodemographic variables (sex, age, academic background, years of experience, among others). Sociodemographic variables were considered as independent variables and digital competence was evaluated as a dependent variable.

Population and sample

The study sample is non-probabilistic or directed (Hernández-Sampieri and Mendoza Torres, 2018). This study was based on a population of 382 teachers who are part of 40 educational institutions belonging to 17 areas of the urban and rural sector of the province of Loja. Male and female teachers of different ages who teach subjects at the levels of elementary and high school from public and private schools in urban and rural areas in the city of Loja were selected. The sample consisted of 193 teachers, of which 111 are women and 82 men; the age ranges that prevail are from 35 to 64 years. It was ensured that the sample was representative with a confidence level of 95%. Table 2 details the characteristics of the participants.

Table 2. *Socio-demographic profile of teachers*

Sex	**N**	**%**
Male	82	42.5 %
Female	111	57.5 %
Generational taxonomy	**N**	**%**
Millennial	39	20.2 %
Generation X	91	47.2 %
Baby Boomers	63	32.6 %

Note. Own elaboration based on the results of the socio-demographic profile of the participants.

Instrument and procedure for data collection

The validation of content and expert judgment was based on the summary of statistics for data analysis proposed by Escobar-Pérez and Cuervo-Martínez (2008). For collecting the data, an online survey was used as the main technique, using a questionnaire developed with the tool ArcGis-Survey123 of the SmartLand platform of the Universidad Técnica Particular de Loja (https://bit.ly/4fAojPO). The survey was sent via email; it was applied from September 14 and extended until October 10, 2022 where the total count was observed. This indicates an approximate duration of two months for collecting the information.

The online survey was distributed using a questionnaire designed specifically to measure digital competences in teachers, based on the Common Framework of the National Institute of Educational Technology and Teacher Training (INTEF) (Tourón *et al.,* 2018). This questionnaire was implemented through an online tool, allowing remote participation of respondents. The adaptation focused on adjusting the questions to the socio-demographic characteristics of the participants, adapting items such as the name, sector and support of the educational institution, among others, to the Ecuadorian context.

The validation process of the questionnaire was carried out with the contribution of six university professors, who are participating in university-level research programs and projects and have broad academic trajectory. The aim was to evaluate the items built and determine the appropriate criteria to know the level of digital competence of high school teachers. This process was carried out using a previously established rubric that evaluated ten criteria, which included coherence, clarity, method, suitability, experience, chance, order, convenience or whether the questionnaire is current.

The scale used for the valuation was 1 to 4, where 1 means "completely disagree", 2 "disagree", 3 "agree" and 4 "completely agree". The minimum scores the questionnaire could obtain was 10 points, while the maximum score was 40 points. According to Supo (2013), it is important that expert professionals have a training in multiple disciplines or be related to the fields of knowledge of interest in order to avoid bias or subjective judgments on the subject of research. After adjusting for judgements and assessments, the questionnaire was structured into two sections. The first section included 12 questions to collect personal and professional identification data from participants. The second section consisted of questions designed to assess tea-

chers' knowledge in the five competency areas established by INTEF (2022). Thirty-five questions were selected that addressed the most relevant aspects related to digital technology in teaching.

To determine the level of digital competence, a five-alternative Likert scale was used, ranging from "I don't know" to "I totally know it". A key process for validating the instrument was to assess the clarity and understanding of the questions through expert judgment, leading to adjustments to improve their quality. A pilot test involving 13 randomly selected teachers was conducted; reliability was measured with Cronbach's Alpha coefficient.

The questionnaire management was carried out via email to an initial population of 382 teachers, following previously agreed guidelines. As a result of this phase, a representative sample of 193 high school teachers was obtained. Ethical protocols were considered to guarantee the privacy and confidentiality of participants, thus ensuring responsible treatment of the information collected.

Results

Validity of the content and reliability of the instrument

The results indicated that 80% of the experts evaluated the questionnaire criteria as completely in agreement, indicating high validity of the content. For this process, the Kendall W index was applied as a statistical analysis, obtaining a value of 0.544, with a Chi-square of 21.75 and an asymptotic significance value of 0.000. This suggests that there is moderate to substantial agreement between the expert assessments, thus reinforcing the validity of the assessment made. The results yielded a high Cronbach Alpha coefficient of 0.98, indicating a solid internal consistency.

Socio-demographic profile

As shown in Table 2, 42.49% of the participating sample is male and 57.51% female. This result is in line with other research at the global, national and local levels that have found a predominant presence of women working in education. Regarding the age range, most teachers belong to Generation

X with 47.15%, followed by Baby Boomers with 32.1%, while Millennials represent 20.21%. The importance of these data lies in the need to consider generational diversity in the planning of educational policies and in the implementation of appropriate pedagogical strategies for each age group. It is evident that 30.6% of teachers have more than 20 years of experience in the profession, while only 0.5% have less than one year in this educational practice. The majority of teachers, 58% work in public educational institutions, 33.2% in public offices and 8.8% in private institutions. The main area of knowledge is Mathematics (23.3%) and less represented Cultural and artistic education with only 3.1%.

Generational Taxonomy and Digital Competence

To determine if age ranges influence the level of DTC of the five areas under analysis, the Chi-square test is applied, its p-value and the frequencies that show the results with respect to the variables of interest. The null hypothesis (H0) in this case is that age does not influence the level of teaching digital competence, while the alternative hypothesis (H1) the opposite, that age does influence the level of teaching digital competence.

Table 3

Age ranges and levels obtained in Area 1: Information and information literacy, Chi-square and Cramer V tests

Generational taxonomy	Levels obtained					Total	Pearson's Chi-square			Cramer V	
	A2	B1	B2	C1	C2		Value	LG	p	Value	p
Millennial		7.7%	25.6 %	38.5 %	28.2%	100 %					
Generation X	2.2%	3,3 %	33.0 %	25.3 %	36.3 %	100 %	20,851a	12	0.05	0.190	0.05
Baby Boomer		11.3%	46.8%	29.0 %	12.9%	100 %					

Table 3 presents the levels obtained in Area 1: "Information and information literacy", divided into four age ranges. This Area 1 focuses on developing competencies to search, evaluate, and use information effectively. The levels of progress are: Basic (A): Awareness of the existence of online resources, elementary evaluation based on the author and the origin of the information: Intermediate (B): Knowledge of licenses for reuse and disse-

mination of resources, considering legal and ethical aspects. Advanced (C): Critical source assessment, alignment with curriculum, and discernment in online relationships and communities.

The results of the statistical tests are observed to evaluate the association between the age of the teachers and the competence levels (A2: Basic); (B1 and B2: Intermediate); (C1 and C2: Advanced). The Pearson Chi-square value is 20.851 with 12 degrees of freedom, and the associated p-value is 0.05. Since the p-value (0.05) is slightly higher than the commonly used threshold of 0.05, we would not reject the null hypothesis, suggesting that age does not significantly influence levels of teaching digital competence in this particular area.

The value of Cramer V, which measures the strength of the relationship, is 0.190, indicating a moderate relationship between the variables. This suggests that although there is a link between age and levels of digital competence, it is not strong enough to be considered significant in most cases. When looking at the frequencies by age group, it is noted that the levels of digital competence in Information and information literacy vary in all groups. Millennials show a diversity of levels, with a significant presence at the C1 level. Generation X presents a diversified competition, with an important presence at levels B2 and C2. Baby Boomers also exhibit a variety of levels, albeit with a significant proportion at lower levels. Generation Z, for the most part, has competition levels at the bottom. From these data, it is concluded that age does not play a significant role in determining the levels of digital teaching competence in the field of information and information literacy.

Table 4

Age ranges and levels obtained in Area 2: Communication and collaboration, Chi-square and Cramer V tests

Generational taxonomy	Levels obtained					Total	Pearson's Chi-square			Cramer V	
	A2	B1	B2	C1	C2		Value	LG	p	Value	p
Millennial		5.1%	33.3 %	33.3 %	28.2%	100 %	13,384[a]	12	0.342	0.152	0.342
Generation X	1.1%	9.9%	34.1 %	25.3 %	29.7%	100 %					
Baby Boomers	3.2 %	17.7 %	40.3 %	24.2 %	14.5 %	100 %					

Table 4 presents the percentage distribution of the different levels (A: Basic, B; Intermediate and C: Advanced) obtained in Area 2: "Communica-

tion and collaboration" in contrast to the different ranges of generational taxonomy observed. This Area 2 includes digital skills to interact and collaborate effectively in educational settings. Understanding "Digital Interaction": The efficient use of digital platforms and the media. "Sharing information": Disseminate contextualized educational resources to facilitate understanding. "Citizen participation online": Responsible use of digital platforms for debates and collaborative learning. And "Online Collaboration": Creating communities and collaborative projects that transcend physical barriers.

The Chi-square test compares the observed frequency in each cell with the expected frequency under the assumption that there is no relationship between the variables (age and level of digital teaching proficiency). If the resulting p-value is greater than 0.05, we would not reject the null hypothesis and conclude that age does not significantly influence the level of teaching digital competence.

The Chi-square Pearson value is 13.384 and the p-value is 0.342. Since the p-value (0.342) is greater than 0.05, there is insufficient evidence to reject the null hypothesis. Based on these data, we can conclude that age does not significantly influence the level of teaching digital competence of the area under study, since there is no statistically significant difference in levels of digital competence between different age groups. The values of the Cramer V obtained in this analysis are relatively low, indicating a null association that is also statistically not significant ($p > 0.05$). With these results, it cannot be affirmed that there is a significant relationship between age and the level of teaching digital competence in this context.

Table 5

Age ranges and levels obtained in Area 3: Creation of digital content, Chi-square and Cramer V tests

Generational taxonomy	Levels obtained					Total	Pearson's Chi-square			Cramer's V	
	A2	B1	B2	C1	C2		Value	LG	p	Value	p
Millennial	2.6%	12.8%	53.8%	20.%	10.3%	100.0 %	22.642[a]	12	0.031	0.198	0.031
Generation X	5.%	25.3%	26.4%	24.2%	18.7%	100.0 %					
Baby Boomers	9.7%	30.6%	37.1%	19.4%	3.2%	100.0 %					

Note. Values of p that are less than the commonly used threshold of 0.05 are highlighted in gray.

The analysis in Table 5 reveals Pearson's Chi-square test, which compares the observed frequencies with those expected under the assumption that there is no relationship between age and level of teaching digital competence in Area 3: "Digital Content Creation". Area 3 refers to skills for producing, adapting and improving educational content. They are the "Digital Tools": Use of software for editing videos, multimedia presentations, and interactive creation. The "Pedagogical Design": Integrate digital tools with specific pedagogical objectives. And "Copyright": Respect for intellectual property and use of appropriate licenses for the creation and distribution of content.

Table 5 yielded a Chi-square value of 22.642 with 12 degrees of freedom and a p-value of 0.031. Since this p-value is less than the commonly used threshold of 0.05, we reject the null hypothesis.

The results reveal a moderate relationship (Cramer's V = 0.198) between age and teaching digital competence. Millennials (21-34 years) show high digital competence, with the majority at B2 level (53.8%). Generation X (35-49 years) has a more uniform distribution of proficiency levels, with B1 (25.3%) being the most common. Baby Boomers (50-64 years) tend to have lower levels of competition, with the majority in B2 (37.1%) and B1 (30.6%). These findings underscore the influence of age on teaching digital competence and the generational differences in this aspect.

Table 6

Age ranges and levels obtained in Area 4: Safety, Chi-square and Cramer's V tests

Generational taxonomy	Levels obtained					Total	Pearson's Chi-square			Cramer's V	
	A2	B1	B2	C1	C2		Value	LG	p	Value	p
Millennial	2.6%	12.8%	43.6 %	23.1 %	17.9%	100 %					
Generation X	8.8%	22.0 %	33.0 %	20.9 %	15.4%	100 %	13,733[a]	12	0.318	0.154	0.318
Baby Boomers	8.1%	27.4 %	41.9%	17.7 %	4.8%	100 %					

Table 6, which examines the relationship between age and the level of teaching digital competence in Area 4: "Security", reveals interesting results. Area 4 is focused on safe and ethical navigation in digital environments. It includes "Data Protection": Password management, privacy settings and prevention of threats such as malware. "Cybersecurity": Identifying misleading

content and protecting against digital harassment; and "Responsible Use": Managing time online, balancing digital and non-digital activities, and measures to reduce environmental impact.

Pearson's Chi-square value, which compares observed to expected frequencies, yielded a result of 13.733 with 12 degrees of freedom, and the associated p-value was 0.318. Since this p-value is greater than the commonly used significance level of 0.05, we would not reject the null hypothesis, suggesting that age does not significantly influence levels of teaching digital competence in this area of safety. The Cramer's V value, which measures the strength of the ratio, is 0.154, indicating a weak relationship between the variables.

When looking at the frequencies by age group, it is noted that, , levels of digital competence in Security varyin all groups, with a diverse presence at each level. Millennials show competition at medium and high levels, Generation X has diversified competition, Baby Boomers exhibit reasonable competition in digital security. From these data, it is concluded that age does not play a significant role in determining the levels of teaching digital competence in the field of Security, which shows us that this competence can be independent of the generation and more related to other factors or specific training.

Table 7
Age ranges and levels obtained in Area 5: problem solving, Chi-square and Cramer's V tests

Generational taxonomy	Levels obtained					Total	Pearson's Chi-square			Cramer's V	
	A2	B1	B2	C1	C2		Value	LG	p	Value	p
Millennial	2.6%	10.3 %	35.9 %	28.2%	23.1 %	100 %	17,719[a]	12	0.124	0.175	0.124
Generation X	7.7%	16.5 %	33.0 %	22.0 %	20.9 %	100 %					
Baby Boomers	8.1%	27.4 %	40.3 %	19.4%	4.8%	100 %					

Table 7 assesses the relationship between age and the level of teaching digital competence in Area 5: "Problem solving". It addresses the ability to identify, analyze and solve digital challenges. Area 5 presents the "Identification and analysis": Decomposition of problems into manageable components and evaluation of solutions. The "Use of tools": Selection of relevant digital applications: and the "Implementation and evaluation": Design effective strategies and adjust according to the results obtained.

Table 7 shows that the Chi-square value is 17.719 with 12 degrees of freedom, and the associated p-value is 0.124. As this p-value is higher than the commonly used significance level of 0.05, the null hypothesis would not be rejected, suggesting that age does not significantly influence levels of teaching digital competence in this area of problem solving. The Cramer's V value, which measures the strength of the ratio, is 0.175, indicating a moderate strength ratio between the variables.

When looking at frequencies by age group, it is highlighted that the levels of digital competence in Problem solving vary in all groups, showing a diversity in each level. Millennials exhibit competition at medium and high levels, Generation X presents diversified competition, and Baby Boomers show reasonable competition in solving digital problems. Based on these results, it can be said that age does not play a significant role in determining the levels of digital teaching competence in the field of problem solving. This suggests that competence in this area may depend more on other factors or a specific training than on the generation of belonging.

Discussion and conclusions

The results of this research confirm a high concordance in the validation of the instrument used, which supports its use to measure the teaching digital competence in educational technology. In relation to the main hypothesis, it is concluded that age is not a determining factor in the level of teaching digital competence in most of the areas evaluated by the Common Framework of Teaching Digital Competence (INTEF, 2022). However, significant differences were identified in the area of Digital Content Creation, where younger teachers excelled in advanced competences (C1 and C2). This finding is consistent with previous studies that point to a positive correlation between technological familiarity and early exposure to digital tools in younger generations (Garzón Artacho *et al.,* 2020; López-Belmonte *et al.,* 2020).

In the areas of Information and Information Literacy, Communication and Collaboration, Security and Problem Solving, data suggest that digital skills are homogeneous across generations. This result reinforces the idea that continuous training and access to technology can mitigate generational gaps, allowing teachers of all ages to reach similar competency levels (Rubio-Gragera *et al.,* 2023; Pozo-Sánchez *et al.,* 2020).

The divergence observed in the area of Digital Content Creation could be explained by factors such as the lack of specific ICT training in older generations, a gap that has been widely documented in previous studies (Asang Mañay, 2018; García i Grau *et al.,* 2022). andounger teachers considered "digital natives" have naturally integrated these skills into their professional development, while older groups require additional efforts to adapt to these technological environments.

The area of safety, although it showed no significant differences, presented an interesting trend: teachers between 40 and 49 years reached the highest levels of competence, probably due to a combination of professional experience and focused training (López-Belmonte *et al.,* 2020). This underlines the importance of including specific digital security modules in teacher training programs.

Finally, the data confirm the need for differentiated training approaches that address the areas with the greatest gaps, such as content creation and empowerment in digital tools. Future studies should explore additional variables, such as academic specialization or educational setting, to better understand the interactions between sociodemographic factors and digital competences (Orozco-Cazco *et al.,* 2020).

In conclusion, age should not be perceived as an obstacle for the development of digital teaching skills. The key lies in promoting educational policies that prioritize transversal technological training adapted to the needs of each generation. In this way, it will be possible to close existing gaps and promote quality education in an increasingly digitized environment.

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Declaration of Authorship - Taxonomy CRediT	
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Mónica Herrera Solorzano	Conceptualization, data curation, formal analysis, validation, visualization, writing – original draft and acquisition of funding.
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Systematic analysis of communicative efficiency between rule-based chatbots and natural language models

Análisis sistemático sobre la eficiencia comunicativa entre chatbots basados en reglas y modelos de lenguaje natural

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Abstract

The study was grounded in a systematic literature review on the communicative efficiencies of rule-based conversational agents and those powered by natural language models with artificial intelligence. A total of 175 documents were analyzed as the basis for this review. Additionally, a historical analysis of the first recorded conversational agent, ELIZA, developed in 1966, was included, highlighting its pivotal role in the emergence of rule-based systems. The study also delved into the arguments underpinning the significant differences between rule-based conversational agents and those leveraging natural language models. These differences revealed that rule-based systems are simple and cost-effective tools, ideal for repetitive and structured tasks, yet constrained in managing complex interactions. Conversely, agents powered by natural language models enable more adaptive and personalized interactions, albeit requiring substantial investment in data and development.

According to the findings, the choice between these approaches depends on the application context, available resources, and the specific needs of the organization. Furthermore, the research underscored the evolution of conversational agents and their transformative impact across various sectors. In this regard, the results open pathways to explore how emerging technological trends, such as advanced natural language processing models, can enhance the efficiency and applicability of these systems while addressing the ethical and technical challenges associated with their implementation in diverse industries.

Keywords

Chatbots, natural language processing, communication, artificial intelligence, NLP.

Resumen

El estudio se fundamentó en una revisión sistemática de la literatura sobre las eficiencias comunicativas de los chatbots basados en reglas y aquellos basados en modelos de lenguaje natural con inteligencia artificial. Se analizaron 175 documentos como base para esta revisión. También se incluyó una breve historia del primer chatbot registrado, denominado ELIZA en 1966, que dio paso al desarrollo de los chatbots basados en reglas. Además, se profundizó en los argumentos que sostienen las notables diferencias entre los chatbots basados en reglas y los basados en modelos de lenguaje. En ese sentido, se revelaron diferencias significativas entre ambos tipos. Los sistemas basados en reglas son herramientas simples y económicas, óptimas para tareas repetitivas y estructuradas, pero limitadas para manejar interacciones complejas. Mientras que los asistentes impulsados por modelos de lenguaje natural ofrecen interacciones más adaptativas y personalizadas, aunque requieren una inversión significativa en datos y desarrollo. De acuerdo al estudio, la elección entre ambos enfoques depende del contexto de aplicación, los recursos disponibles y las necesidades específicas de la organización. Además, los resultados evidencian la evolución de los asistentes conversacionales y su impacto en diversos sectores, en ese sentido, los resultados permiten explorar cómo las tendencias tecnológicas emergentes, como los modelos avanzados de procesamiento de lenguaje natural, pueden ampliar la eficiencia y la aplicabilidad de estos sistemas, enfrentando a la vez desafíos éticos y técnicos asociados con su implementación en diversas industrias.

Palabras clave

Chatbots, procesamiento del lenguaje natural, comunicación, inteligencia artificial, PLN.

Introduction

Chatbots, also known as virtual assistants, have evolved significantly since their inception, moving from simple rules-based programs to sophisticated systems driven by natural language models. This evolution has been driven by advances in artificial intelligence (AI) and natural language processing (NLP), which has allowed conversational attendees to interact more effectively and naturally with users (Joulin, 2017).

The size of the virtual assistant market is growing rapidly, from $250 million in 2017 to more than $1.34 billion in 2024 (MarketsandMarkets, 2020). More than 21 % of adults in the United States and more than 80 % of Gen Z use voice/text bots for information search and shopping (Pew Research Center, 2022). Many brands, such as American Eagle Outfitters and Domino's Pizza, have implemented chatbots to take orders or recommend products, and major platforms such as Amazon, eBay, Facebook, and WeChat have adopted chatbots for conversational commerce (Luo *et al.,* 2019).

With the ChatGPT foray launched by OpenAI in November 2022, the size of the conversational agent user market soared. According to data from Silverio (2024), as of November 2023, the number of users of ChatGPT was 180.5 million globally, and the number of visitors to its page reached 1.626 million in February 2024.

This study presents a systematic literature review on the foundations and communicative efficiency of conversational assistants based on predefined rules and those designed by natural language models with AI. The review was based on the analysis of 175 academic documents and considered, in addition, a historical perspective by including ELIZA, the first system registered in 1966, which laid the foundations for systems structured in rules.

In addition, the analysis delves into the key differences between conversational assistants designed under rules and those driven by natural language models. Rule-based systems were identified as simpler and more economical, albeit limited, solutions for managing complex human interactions. On the other hand, systems based on natural language models proved to be more adaptive and natural in their interactions, although their development requires significant investment and large volumes of data.

The choice between these systems depends on the needs and resources of the organization. The main findings highlighted the evolution, benefits and disadvantages of both types of virtual assistants, providing a basis for future research and practical applications in various industries.

Evolution and rule-based chatbot technologies

A rule-based virtual assistant, also known as a decision tree virtual assistant, uses a predefined set of rules to handle interactions with users. These rules are based on specific keywords or patterns in user communication and are organized in a similar way to a flowchart to anticipate potential questions and provide appropriate answers (Dale, 2020).

According to a Hubtype (2023) article, these conversational assistants are easier to build and maintain compared to artificial intelligence-based chatbots. They do not require continuous learning, making them faster and cheaper to implement. However, they are limited to the scenarios for which they were programmed and cannot handle questions outside of their predefined rules.

Another source highlights that rules-based conversational agents are common in applications where interactions are predictable and repetitive, such as in customer service or FAQ systems. These chatbots cannot learn from new interactions or communications, limiting their ability to handle more complex or dynamic conversations (Caldarini *et al.,* 2022).

According to Caldarini *et al.* (2022), searches are performed on databases such as IEEE, ScienceDirect and Springer using terms related to virtual assistants to identify relevant articles. Areas addressed include Natural Language Processing (NLP) and Artificial Intelligence (AI). In addition, repositories such as arXiv, Google Scholar and JSTOR are explored, where 62,254 relevant publications on these topics are selected.

Rules-based conversational assistants, due to their simplicity, are preferred in situations where a quick and economical solution is required. However, their inability to adapt to new situations limits their effectiveness in dynamic environments (Pradella, 2016).

In contrast, virtual assistants based on natural language models, although more complex and expensive, offer greater adaptability and ability to handle unforeseen interactions, making them ideal for more advanced and demanding applications (Dale, 2020).

History and development of the first chatbots

Early virtual assistants, such as ELIZA, created by Joseph Weizenbaum in the 1960s, relied on predefined rules to simulate a human conversation. ELIZA used predefined keyword patterns and responses to interact with users,

allowing it to hold basic conversations, although it lacked the ability to understand the context or intent behind the user's words (Weizenbaum, 1966).

Reviewing its history, ELIZA was a program developed at MIT that allowed the first natural language interaction between a human and a computer. Operating on the MAC timesharing system, ELIZA analyzed input sentences based on keyword-triggered decomposition rules and generated responses using reassembly rules (Weizenbaum, 1966).

ELIZA's main goal was to explore how computers can simulate human conversations using predefined rule structures. These systems were limited and predictable, suitable only for simple tasks and predefined dialog structures (Shawar and Atwell, 2007).

ELIZA simulated a conversation using a pattern matching and substitution methodology that gave users the illusion of understanding, although it lacked an integrated framework for contextualizing events (Weizenbaum, 1966; Goldman, 2017). Pattern matching is a key methodology in the development of rules-based virtual assistants. This approach focuses on identifying specific patterns in user input to generate predefined responses (Goldman, 2017).

One of the notable contributions in Weizenbaum's (1966) study was that ELIZA managed to maintain a coherent conversation, largely dependent on the assumptions and rationalizations the user made about the program's capacity. Users tended to attribute understanding and knowledge to the program, filling in the gaps with their own imagination and expectations. Weizenbaum (1966) also mentions the possibility of conducting experiments to explore the extent to which users can be convinced that they are interacting with a human rather than a machine. This leads to the famous "Turing Test", where the goal is that a user cannot distinguish between a conversation with a human and one with a machine. The credibility of ELIZA's responses is crucial to maintain this illusion.

In Weizenbaum's study (1966), it is noted that ELIZA is able to create the illusion that she understands the user's input, although she does not really understand the context or intention behind the words. This is achieved through responses generated by predefined rules that seem pertinent to the conversation, thus tricking the user into believing that they are being understood.

Weizenbaum chose the simulation of psychotherapeutic interviews because in this type of interaction, the therapist can adopt a stance of knowing very little of the real world, allowing ELIZA to function effectively without a deep knowledge of the context. For example, if a user says "I feel sad," ELIZA

may respond with "Why do you feel sad?", a generic but appropriate response that maintains the illusion of meaningful conversation (Weizenbaum, 1966).

Definition and operation

Pattern matching chatbots use predefined rules to map questions and answers. For example, ELIZA, one of the first chatbots, used substitutions and templates of text patterns to simulate a therapeutic conversation, creating the illusion of understanding without really understanding the context of the interactions (Caldarini *et al.,* 2022). These conversational assistants are effective at handling simple and predictable interactions, but lack the ability to adapt to more complex and dynamic contexts due to their reliance on strict, predefined rules.

The pattern matching methodology focuses on identifying specific patterns in user input to generate predefined responses. This approach may be sufficient in applications where interactions are repetitive and structured, such as in customer service or FAQ systems. However, the lack of ability to learn and adapt to new interactions significantly limits the effectiveness of these AI-based assistants in environments where greater contextual understanding and adaptability is required (Goldman, 2017).

Virtual assistants based on pattern matching represent a basic and economical solution for certain applications, but their usefulness is limited by their inability to handle the complexity and variability of the most advanced human interactions (Pradella, 2013).

Example of its implementation

ALICE (*artificial linguistics internet computer entity*) is another notable example that uses the *artificial intelligence markup language* (AIML) to define patterns and templates. This chatbot classifies user entries into categories and responds according to predefined templates that match input patterns (Xue, 2024).

AIML allows developers to create rule sets that determine how the chatbot should respond to different user entries. These rules are structured into templates that define specific text patterns and the corresponding responses.

Meanwhile, Liu and Lan (2016) state that when the user enters a query, ALICE searches its template database for a match and generates a response based on the corresponding template. This process allows ALICE to handle a wide variety of interactions quickly and efficiently, although it remains limited by the need for predefined templates and a lack of deep understanding of the context or user intent.

Using AIML in ALICE demonstrates how pattern matching-based virtual assistants can be customized and expanded by adding new templates and rules, allowing them to handle a wider range of interactions. However, like other rules-based conversational agents, ALICE cannot learn from new interactions or adapt to changes in context without manual intervention by developers (Ramírez and Valle, 2022).

Compared to conversational assistants based on natural language models, which can process and understand human language more flexibly and adaptively, virtual assistants such as ALICE offer a simpler and more economical solution for applications where interactions are predictable and repetitive (Hoyer *et al.*, 2020).

Methodology

This study adopted a systematic review methodology of scientific literature to analyze the characteristics and differences in the communicative efficiency of conversational assistants based on rules and natural language models. The search was carried out in recognized databases, including Google Scholar, Emerald, Elsevier, Taylor & Francis, IEEE/IEEE Xplore and FLACSO Andes, considering publications of the last five years and articles with public access (Perdomo, 2020).

The snowball technique was implemented to identify additional relevant studies in Google Scholar (Pucci *et al.,* 2020). Theoretical and explanatory foundations from previous methodologies were also included, considering those published before the analysis period, since they were relevant for studying conversational assistants based on rules and natural language.

The search strategy was structured in three main blocks of keywords, both in English and Spanish, related to the characteristics, differences and emerging trends in the study of conversational assistants based on rules and natural language. The references that matched these keywords in the title or

body of the publications were selected and analyzed chronologically, forming a final sample of 175 relevant documents.

In addition, a content analysis of the selected literature was carried out to deepen the meaning of the terms, the differences and similarities, the distinctive characteristics and the emerging areas of research on conversational assistants structured in rules and those based on natural language models (Peralta and Guamán, 2020). This analysis allowed to identify conceptual definitions, typologies and applications of these systems, particularly in areas such as commerce and customer service.

Table 1

How pattern matching works in chatbots

Process	Description	Specific example
User input	The user enters a message to the *chatbot*.	"Hello, how are you?"
Input analysis	Identification of keywords in the message.	Hello and how you are identification
Predefined patterns	Database of patterns that the *chatbot* uses.	"Hello, how [verb]?"
Pattern matching	Comparison of the user's message with patterns.	Comparison with "Hello, how [verb]?"
Response selection	Selection of the corresponding response template.	"I'm fine, how are you?"
Response generation	Replacing markers in the response template.	Substitution of "[verb]" with "are"
Output to user	The *chatbot* sends the final response to the user.	"I'm fine, how are you?"

Note. This simplified schema shows how a rules-based chatbot uses pattern matching to process inputs and generate appropriate responses.

Advantages and limitations of rule-based chatbots

Chatbots operate according to a set of predefined rules, allowing them to provide consistent and predictable responses. They are ideal for tasks such as customer support, data collection and 24/7 support, offering significant benefits in terms of cost and simplicity of implementation. In addition, these virtual assistants are highly flexible in integrations with other data management or customer service systems, making them particularly useful in corporate and commercial environments (AirDroid, 2024).

By following strict and well-defined rules, rule-based virtual assistants can efficiently handle a high volume of interactions, reducing the workload

of human agents and improving operational efficiency. However, their capacity is limited to the scenarios for which they were programmed. They cannot handle questions outside of their predefined rules and lack the ability to adapt to more complex or contextual interactions (Caldarini *et al.,* 2022).

The design and implementation of these automated dialog systems are relatively straightforward compared to virtual assistants based on natural language models. They do not require continuous learning or large volumes of data to function properly, making them a viable option for organizations with limited resources. In addition, its maintenance is less expensive and can be handled internally by IT teams without the need for artificial intelligence experts (Goldman, 2017).

On the other hand, rule-based virtual assistants have limited flexibility due to their inability to handle queries outside of predefined rules. They do not have the ability to learn and adapt to new situations, which restricts them to respond only within the parameters established initially. This means that any query that is not specifically scheduled within its rules cannot be effectively managed.

In addition, virtual assistants are suitable only for simple and straightforward tasks, as complex or multi-step interactions are often difficult to handle. This simplicity in their operation makes them useful for basic functions, but ineffective in scenarios that require greater sophistication in the processing of interactions (Xue *et al.,* 2024).

Another significant disadvantage is their inability to learn from experience. They cannot improve their responses over time and require manual updates to handle new queries, which increases the maintenance burden. As for the user experience, these chatbots are less effective at providing smooth conversational interaction and can be frustrating if queries do not exactly match the predefined rules. This can lead to an unsatisfactory user experience, especially when users expect more dynamic and adaptive responses (Hubtype, 2023; AirDroid, 2024; Xue *et al.,* 2024).

Chatbots in customer service areas

Rule-based chatbots are programs that follow a set of predefined instructions for interacting with users, particularly useful in customer service because of their ability to handle repetitive, structured queries efficiently.

These chatbots provide fast and consistent responses, often resulting in high customer satisfaction when queries are simple and straightforward (Nicolescu and Tudorache, 2022).

Nicolescu and Tudorache (2022) conducted a systematic review of the user experience with chatbots in customer service. They identified that the most influential factors in customer satisfaction include the relevance of responses and problem solving. Rule-based chatbots excel in these respects by providing fast and consistent responses, often resulting in high customer satisfaction when queries are *simple and straightforward.*

For its part, *Caldarini et al.* (2022) reviewed recent advances in chatbots, noting that although rule-based chatbots are limited in their ability to handle complex conversations, they remain valuable for specific, well-defined tasks in customer service. These systems are less expensive and easier to implement compared to chatbots based on language models, making them a viable option for many companies.

However, Ledro *et al.* (2022) highlighted in their study on Customer Relationship Management (CRM) that rules-based chatbots are effective in improving the customer experience at specific touchpoints. These chatbots can be integrated into CRM systems to provide fast and accurate answers to frequently asked questions, reducing the workload of customer service staff and improving operational efficiency.

In that sense, Ledro *et al.* (2022) explored the use of rules-based chatbots in the context of e-commerce. Their study showed that tools like Chatfuel allow companies to implement chatbots quickly and efficiently to improve customer interaction. The authors found that these chatbots are effective in managing frequent queries, improving customer satisfaction and optimizing the company's resources.

For its part, López *et al.* (2021) investigated the implementation of virtual assistants in CRM systems of technology companies. They found that rules-based chatbots, such as those implemented by the ManyChat platform, are crucial to providing ongoing support to customers. The research highlighted the importance of integrating these chatbots with other corporate systems to maximize their effectiveness and ensure consistent and rapid responses to customer queries.

Rule-based virtual assistants have been widely used in applications with simple and structured interactions, such as in customer service or FAQ systems (Shawar and Atwell, 2007). These chatbots stand out for their ability to

provide fast and consistent responses in predictable scenarios, making them an effective solution for repetitive and well-defined tasks.

However, one of the main limitations of rules-based virtual assistants is their lack of adaptability and learning ability. These chatbots operate according to a predefined set of rules and cannot handle queries outside these parameters without manual updates (Xue *et al.,* 2024). This limitation restricts their use to specific and limited contexts, making them less suitable for situations that require dynamic and adaptive responses.

The psychological impact of ELIZA was significant, as it explored how computers could trick users into believing they were interacting with a human. This concept pioneered the field of artificial intelligence and laid the groundwork for future experiments, including the famous Turing Test proposed by Alan Turing in 1950. This test raises the question of whether a machine can exhibit intelligent behavior equivalent to or indistinguishable from that of a human being, which has been a central theme in research into artificial intelligence and the perception of human-machine interaction (Weizenbaum, 1966).

Natural language processing

Natural language processing (NLP) is a subdiscipline of artificial intelligence (AI) that focuses on understanding and generating human language, both spoken and written. In the context of marketing, the NLP is used to analyze large volumes of textual data, such as product reviews, interactions with voice assistants, and sales call transcripts. Traditional techniques include topic modeling and sentiment analysis, while more recent approaches rely on pre-trained language models and transfer learning for tasks such as automatic text generation and learning of multimodal representations (Hartmann and Netzer, 2023).

Another way of defining NLPs, along with text mining and natural language understanding, helps companies and organizations extract valuable information from unstructured data. As the business environment evolves, companies must integrate data from diverse sources to stay competitive. The NLP offers fast and efficient methods to process this data, facilitating tasks such as customer service automation and human resources management (Kwartler, 2021).

The development of natural language processing (NLP) has been crucial to the evolution of chatbots. The NLP allows chatbots to understand the context and meaning behind words, significantly improving human-computer interaction. Tools such as syntactic and semantic analysis, along with machine learning techniques, have allowed chatbots to interpret and respond more accurately to user queries (Caldarini *et al.,* 2022).

Since their introduction, transformers have been the basis of many advanced models, such as BERT (*Bidirectional Encoder Representations from Transformers*) and the GPT (*Generative Pre-trained Transformer series*). BERT, developed by Devlin (2019), was a significant advance as it allowed for bidirectional comprehension of the text, improving accuracy in several NL tasks (Laranjo *et al.*, 2018).

New scenario for using ChatGPT

Natural Language Processing (NLP) has advanced significantly thanks to natural language models, which have revolutionized the way machines understand and generate text. One of the most important milestones in this field was the introduction of transformer models in 2017, through the article "Attention is all you need" by Vaswani *et al.* (2017) These models have overcome the limitations of recurrent neural networks (RNNs) by using attention mechanisms to manage long-term relationships in text sequences.

Transformers have been the basis of advanced models such as BERT (*Bidirectional Encoder Representations from Transformers*), developed by Devlin *et al*. (2019) BERT enabled two-way understanding of the text, improving accuracy in various NLP tasks. Another prominent example is the GPT (*Generative Pre-trained Transformer*) series of OpenAI, which includes models such as GPT-1, GPT-2, GPT-3 and the recently released GPT-4. These models have shown a continuous increase in the number of parameters and capabilities. For example, GPT-3, with 175 billion parameters, has demonstrated advanced skills in text generation and language comprehension.

The even larger, multimodal GPT-4 incorporates 1.8 trillion parameters, allowing it to handle a wider variety of tasks with greater accuracy and efficiency. These models have been critical for applications across multiple domains, transforming the way people interact with technology and handle information.

In that sense, natural language models have been essential for applications in various fields, such as education, medicine and customer service, transforming interaction with technology. The benefits of these models include significant improvements in language comprehension, more accurate and efficient text generation, and advanced capabilities in a variety of natural language processing-related tasks. For the authors of this study, the present and future of communication between humans and machines is natural language.

Chatbots based on natural language

Natural language virtual assistants are computer programs that allow interacting with users through conversational interfaces. They use natural language comprehension platforms, such as Dialogflow and IBM Watson Assistant, to develop conversational agents that can be integrated into mobile applications, websites, and interactive voice response systems (Bhattacharyya, 2024).

On the other hand, Huang and Gursoy (2024) mention that virtual assistants using natural language models are systems designed to improve customer satisfaction during online interactions. They use different language styles (abstract or concrete) depending on the stage of the customer's decision-making process, providing emotional and informative support effectively. These virtual assistants are able to tailor their communication to deliver a more personalized and relevant experience.

For Ciechanowski *et al.* (2019), a chatbot is a conversation platform that communicates with the user through natural language, using applications, software or computer interfaces. These chatbots are based on technical applications of artificial intelligence that allow a fluent and natural interaction between humans and machines. The artificial intelligence applied in these chatbots facilitates the management of business processes, improving efficiency and customization of customer service.

For Bhattacharyya (2024) chatbots powered by large language models (LLMs) are artificial intelligence tools designed to interact with users through the use of natural language processing (NLP). These chatbots can understand and generate text in a consistent way, responding to customer queries in real time. They use advanced NLP techniques and are trained on large amounts of data to improve their accuracy and relevance in responses.

These conversational assistants have proven to be highly efficient in business process management, enabling customer service automation, cost reduction, and improved customer satisfaction through 24/7 availability and customization of responses (Ciechanowski, 2019).

AI-based wizards can be developed using agile methodologies that enable continuous system adaptation and improvement. Usability assessment is critical to ensure that chatbots meet the requirements of accuracy, functionality, and user satisfaction (Paschek *et al.,* 2017).

Communication efficiency between both types of virtual assistants

The communication efficiency of rules-based virtual assistants and natural language (NLP) models has been the subject of several studies, highlighting key differences in their performance and applicability. Rule-based chatbots operate by applying predefined conversation flows and rely heavily on specific keywords. This allows them to execute simple and repetitive tasks with high efficiency, but their ability to adapt to more complex queries is limited.

According to Buhalis and Yen (2020), these chatbots can be frustrating for users when they fail to handle natural language variations, which frequently leads to errors and misunderstandings. In contrast, NLP-based chatbots use advanced machine learning algorithms to interpret and generate natural language responses. These chatbots are able to understand the context and intention of the user, offering more precise and personalized answers.

Amalia and Suprayogi (2019) highlight that although the development and implementation of NLP-based chatbots require greater investment in terms of data and processing, their ability to learn and improve over time makes them a more efficient tool for handling complex and diverse interactions.

A comparative study by Hu *et al.* (2018) in the tourism sector showed that NLP-based chatbots outperform rules-based chatbots in terms of customer satisfaction and query resolution. NLP-based chatbots not only understand what the user is saying, but also the tone and context of the conversation, allowing them to deliver a more seamless and effective user experience. This ability to adapt and customize results in greater efficiency and effectiveness in communication, especially in environments where user queries are varied and complex.

Studies in the business field, such as Jindal *et al.* (2020), have shown that the implementation of NLP-based chatbots can lead to a significant improvement in operational efficiency and customer satisfaction. These virtual assistants can handle a higher query load simultaneously and provide more accurate responses, reducing the need for human intervention. Despite initial challenges in their development, the long-term benefits of NLP-based conversational assistants in terms of scalability and adaptability greatly outweigh rules-based chatbots, making them a preferred choice for many organizations (Ling *et al.*, 2021).

Table 2
Systematization of contributions to chatbots and natural language models

Authors	Year	Background	Relevant aspects
Weizenbaum	1966	Human-computer interaction	Psychological impact of ELIZA and the ability of computers to simulate human conversations.
Colby *et al.*	1971	Simulation of psychotherapy	Creation of PARRY, a *chatbot* that simulated a patient with schizophrenia, exploring the simulation of emotional states.
Winograd, T.	1972	Understanding natural language	Development of SHRDLU, a system that understood and generated natural language in the context of a world of blocks.
Schank and Abelson	1977	Theory of scripts and narrative structures	Development of theories on how artificial intelligence systems can understand and generate stories.
Bobrow and Winograd	1977	Dialog Models	Research in dialog models and understanding the structure of human conversations by *chatbots*.
Hayes-Roth and Hayes-Roth	1979	Interactive planning systems	Research on interactive planning systems and their application in *chatbots.*
Carbonell, J. G.	1980	Natural language learning and generation	Introduction of learning techniques to improve the generation and understanding of language in *chatbots.*
Wilensky, R.	1983	Language planning and understanding	Research in script-based planning for natural language understanding in *chatbots.*
Grosz and Sidner	1986	Dialog Structure	Studies on the structure and coherence of dialogs, essential for the development of interactive *chatbots.*
Allen, J. F.	1987	Temporary planning in dialogs	Research on how *chatbots* can understand and manage time planning in conversations.
Luger and Stubblefield	1998	Artificial Intelligence and Natural Language	Contributions to the field of AI and the application of NLP techniques in *chatbots*.

Authors	Year	Background	Relevant aspects
Abu Shawar and Atwell	2007	Simple and structured tasks	Effectiveness of rule-based *chatbots* in repetitive and predictable interactions.
Nicolescu and Tudorache	2022	Customer Service	Improving operational efficiency through rapid and consistent responses to frequent inquiries.
Caldarini *et al.*	2022	Efficiency in customer service	Effectiveness of rules-based *chatbots* in customer service.
Xue *et al.*	2024	Limitations and Maintenance	Limitations in the adaptability and manual maintenance of rules-based *chatbots.*
Vaswani *et al.*	2017	Natural language models	Introduction of transformers, overcoming the limitations of NRNs with attention mechanisms.
Devlin *et al.*	2019	Bi-directional models	Development of BERT, improving accuracy in various NLP tasks.
Hu *et al.*	2018	Learning and Adaptability	Machine learning algorithms for continuous improvement of *chatbot* responses.
Jindal *et al.*	2020	Handling complex queries	Advanced query handling capabilities not initially anticipated by NLP-based *chatbots.*
Hill *et al.*	2015	Human-computer interaction	Improvements in human-computer interaction using machine learning techniques.
Ding *et al.*	2024	Language Model Applications	Transformation of interaction and information management across multiple domains using GPT-4 and other advanced models.
Hartmann and Netzer	2023	PLN in marketing	Applications of the NLP for the analysis of textual data in marketing.
Badr	2024	Advances in natural language models	Increase in the number of parameters and capabilities of GPT models, improving text generation and comprehension.
El-Ateif *et al.*	2024	Applications across multiple domains	Applications of advanced NLP models in education, medicine and customer service.

Note. Key contributions from authors and development of chatbots and natural language processing from 1960 to 2024.

Current and future applications

For its part, Gnewuch *et al.* (2021) note the importance of assessing the effectiveness of virtual assistants not only in terms of technical accuracy, but also in terms of user experience and business outcomes. Continuous research and development in the design of virtual assistants focuses on improving the-

se metrics to ensure that virtual assistants not only function properly, but also provide tangible value to users and organizations.

Currently, chatbots are used in a variety of fields, from customer service to education and health, however, virtual assistants can handle simple queries, and allow human agents to concentrate on more complex problems. In education, AI-managed virtual assistants can act as virtual tutors, providing personalized assistance to students (Chaves and Gerosa, 2021).

In the future, the integration of technologies such as conversational AI and language models is expected to continue to improve the effectiveness and versatility of chatbots, thus expanding their application in various industries and improving human-computer interaction (Wang and Jiang, 2020).

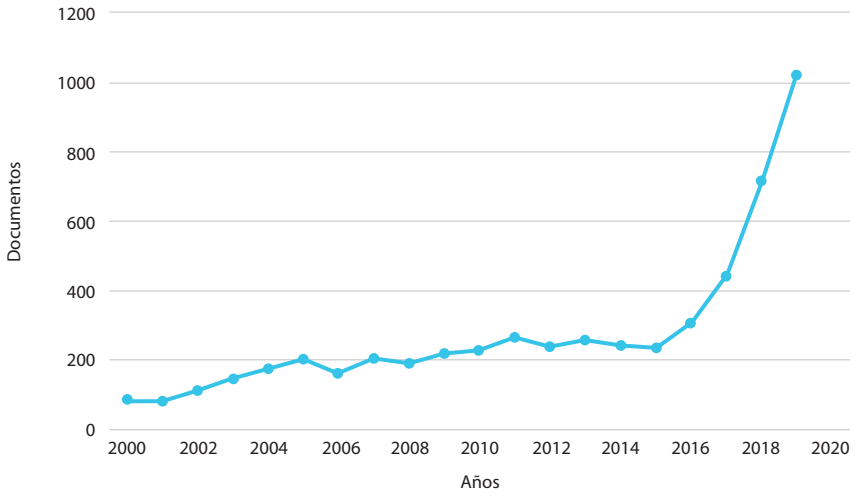
Results

Rule-based chatbots are easier to build and maintain, and do not require continuous learning, which makes them more economical to implement, because they operate with predefined rules, provide consistent and predictable responses, which is beneficial for repetitive and well-defined tasks, such as in customer service (Hubtype, 2023). These virtual assistants can be rapidly deployed in applications where interactions are predictable and repetitive, improving operational efficiency without the need for complex configurations (Ledro *et al.,* 2022).

Conversational rules-based systems stand out for their ease of construction and maintenance, not relying on continuous learning, which makes them inexpensive and accessible solutions. Operating under predefined rules, these systems provide consistent and predictable responses, being especially useful in repetitive and structured tasks, such as customer service (Laranjo *et al.*, 2018).

Inability to understand context and language variations can result in frustrating experiences for users, especially when queries do not match predefined rules. In addition, they require manual updates to handle new queries or changes in interaction patterns, which can increase the long-term maintenance burden (Xue, 2024).

Figure 1
Scopus search results on chatbot



Note. From Caldarini *et al*. (2022): Scopus search results, from 1970 to 2021, for keywords "chatbot" or "conversational agents" or "conversation system".

Discussion

The analysis of conversational assistants, both those structured in rules and those based on natural language models, reveals significant differences that impact their applicability and efficiency in specific contexts. These findings allow to establish scenarios in which each type of system is more suitable, highlighting not only its benefits, but also the challenges they present in its development and implementation.

Rules-based wizards are notable for their simplicity and speed of implementation, being effective tools for scenarios where interactions are predictable and structured, such as frequently asked questions (FAQ) systems or basic customer service. However, their inability to manage complex queries or adapt to new situations limits their application in dynamic environments. Conversely, systems based on natural language models offer more fluent and personalized communication, enabling adaptive interactions that understand the context and intentions of the user. This attribute makes them ideal for

complex tasks, such as assisting in educational processes, medical services, or advanced e-commerce.

The efficiency of the conversational assistants depends largely on the type of task, the user profile and the context of use. For example, in sectors such as education, natural language-based systems allow learning to be personalized, adapting to the individual needs of each student. In the business environment, its ability to manage simultaneous and personalized interactions enhances the customer experience. However, their performance may be affected by technical limitations, such as the quality of training data, or by ethical issues related to user privacy.

Despite their advantages, assistants based on natural language models face significant challenges in their implementation. The need for large volumes of quality data, combined with the complexity of development processes, increases costs and implementation times. In addition, ethical management of the data used in training and transparency in the use of artificial intelligence are critical aspects that require attention. On the other hand, rules-based systems, although cheaper and faster to implement, have limited utility in contexts that require flexibility and deep understanding of language (Tuan-Jun *et al.*, 2024).

In that sense, the advance in natural language models, such as recent developments in transformer architectures and deep learning, suggests a promising future for conversational attendees. Integrating these technologies with other artificial intelligence systems, such as enhanced learning and computer vision, could significantly expand their capabilities, enabling applications in emerging areas such as mental health, augmented reality, and multimodal interaction. But these advances must be accompanied by clear regulations and strategies that ensure the balance between technological innovation and ethical accountability.

Conclusions

Rules-based wizards are notable for their simplicity and speed of implementation, being effective tools for scenarios where interactions are predictable and structured, such as frequently asked questions (FAQ) systems or basic customer service. However, their inability to manage complex queries or adapt to new situations limits their application in dynamic environments.

Conversely, systems based on natural language models offer more fluent and personalized communication, enabling adaptive interactions that understand the context and intentions of the user. This attribute makes them ideal for complex tasks, such as assisting in educational processes, medical services, or advanced e-commerce.

These capabilities not only enable more fluent and natural communication, but also improve the overall user experience by providing personalized and adaptive interactions. In addition, NLP-based virtual assistants have the ability to learn from past interactions and improve over time, a significant advantage over rule-based chatbots, which are limited to pre-programmed responses and cannot adapt to new situations or demands without manual intervention (Hu *et al.,* 2018). These attributes make NLP-based chatbots much more effective and versatile tools for addressing the dynamic challenges of customer service and other interactive applications.

The study demonstrated a clear superiority of chatbots based on natural language models (NLP) in terms of naturalness and adaptability. These assistants provide more fluid and contextual interactions, resulting in a significant improvement of the user experience. The ability of NLP-based chatbots to accurately understand and respond to a wide variety of queries, including those not initially anticipated, makes them especially valuable in dynamic and complex environments (Hoyer *et al.*, 2020).

Despite their limitations, rule-based virtual assistants continue to be useful in environments where predictability and structure are essential. Their simplicity, lower cost, and ease of deployment make them ideal for specific applications, such as FAQs and basic customer support. The consistency and speed of the implementation of these chatbots offer efficient solutions for repetitive and well-defined tasks.

Implementing wizards based on natural language models involves higher cost and complexity, which can be a significant challenge for organizations, but their ability to learn and adapt over time justifies long-term investment. The need for advanced infrastructure and large volumes of data to train these models is offset by the benefits in terms of user satisfaction and operational efficiency. Syntactic and semantic analysis, along with machine learning techniques, allows NLP-based chatbots to manage complex interactions effectively, improving the quality of communication between humans and machines.

In future research, it is critical to analyze how integrating these virtual assistants with other emerging technologies, such as artificial intelligence and

deep learning, can further improve their performance and applicability. The continued evolution of natural language models, such as recent developments in transformer models, indicates a promising future for human-machine interaction, where communication becomes increasingly natural and effective.

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Metaverse and neuromarketing: methodological innovation in the study of the consumer and the retail

Metaverso y neuromarketing: innovación metodológica en el estudio del consumidor y del retail

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Abstract

Neurotechnologies lead to the study of the nervous system and the improvement of its function, and they are aimed to represent one of the great technological leaps of our time. Traditionally, they have been used in the field of health; however, their widespread adoption due to operational efficiency and cost has driven their use in various areas within the social sciences through the discipline known as neuromarketing or consumer neuroscience, applying it to market research.

The emergence of the metaverse could introduce new methods for studying individuals and audiences due to the wide range of neurophysiological recording sensors (eye tracking, EEG, EDA...) incorporated into virtual reality and augmented reality hardware. This paper focuses on the potential of these technologies in the context of the metaverse for researching consumers' interests in a broad range of business areas such as communication, fashion, advertising, tourism, and even education.

To depict this situation, a literature review, document analysis, and interviews with experts in cognitive neuroscience, artificial intelligence (AI), and neuroarchitecture are conducted. The research highlights the interest of consulting firms in using virtual reality for the design and analysis of retail environments and product placement. While the results demonstrate the presence of neurophysiological sensors in metaverse devices and the possibility of conducting neurophysiological research, there are still technological and basic scientific knowledge obstacles to overcome.

Keywords

Metaverse, neuromarketing, innovation, consumer behavior, artificial intelligence, TIC, business, retail, fashion, gaming.

Resumen

Las neurotecnologías conducen al estudio del sistema nervioso y a mejorar su función, y están llamadas a representar uno de los grandes saltos tecnológicos de nuestros días. Tradicionalmente han sido utilizadas en el campo de la salud, sin embargo, su universalización, por operatividad y coste, ha impulsado su empleo en diferentes áreas dentro de las ciencias sociales mediante la disciplina denominada neuromarketing o neurociencia del consumidor para aplicarla en la investigación de mercados.

La aparición de metaverso podría incorporar nuevas fórmulas para el estudio de individuos y audiencias debido a la amplia gama de sensores de registro neurofisiológico (*eye tracking*, EEG, EDA…) incorporados en el *hardware* de la realidad virtual y la realidad aumentada. El presente trabajo se focaliza en el potencial de las mencionadas tecnologías en el contexto de metaverso para la investigación de consumidores de interés en una amplitud de ámbitos empresariales como puede ser la comunicación, la moda, la publicidad, el turismo, o incluso la educación.

Con el objeto de retratar dicha situación se lleva a cabo una revisión bibliográfica, un análisis documental y entrevistas a expertos en neurociencia cognitiva, inteligencia artificial (IA) y neuroarquitectura. La investigación señala el interés de consultoras por el empleo de la realidad virtual en el diseño y análisis de entornos de *retail* y de emplazamiento de producto. Si bien los resultados evidencian la existencia de sensores neurofisiológicos en los dispositivos de metaverso y la posibilidad de realizar investigación neurofisiológica, todavía existen obstáculos tecnológicos y de conocimiento científico básico que superar.

Palabras clave

Metaverso, neuromarketing, innovación, comportamiento del consumidor, inteligencia artificial, business, retail, moda, gaming.

Introduction

The metaverse, a virtual environment in which individuals interact and experiment through avatars and digital entities, and it is transforming the way brands and commerce will relate to individuals. Virtual reality opens new spaces to understand the cognitive and emotional processing of the human being (Riva and Wiederhold, 2022) through neuroscience methodologies. There are many laboratories works that analyze brain activity through neurotechnology (Barrios *et al.,* 2017), which is called to become the great technological leap of our days (Aguiar, 2021).

Virtual reality (VR) environments drive methodological innovation, especially around techniques and metrics that enable biometric and physiological monitoring (Dincelli and Yayla, 2022; Egliston and Carter, 2021). Electrocardiography (ECG), electrooculography (EOG), respiratory rate (RR) or temperature (TMP), electrodermal activity (EDA), electroencephalography (EEG), electromyography (EMG) (Angelini *et al.,* 2022; Dincelli and Yayla, 2022; Guo and Gao, 2022) are susceptible to be introduced into VR research.

Metaverse offers an alternative reality through immersive and interactive virtual worlds that rest on VR (*virtual reality*), AR (*augmented reality*), and MR. (*mixed reality)* (Ning *et al.*, 2021). While its headsets and other peripheral devices integrate neurophysiological ledger sensors required to support VR/AR systems, this technology would have potential to be used in commercial research. This article reflects on the role of these technologies in the context of metaverse and consumer understanding.

2. Methodology

The research investigates the potential of neurophysiological technologies in the metaverse environment. Specifically, it will seek to:

1. Identify neuro implementable technologies in metaverse
2. Recognize the potential of neurophysiological technologies in the metaverse:
   2.1. Validity in the neurophysiological registry
   2.2 Cognitive and emotional processes
   2.3 Benefits for companies and users

3. Identify the protocols of commercial research in metaverse with neurophysiological technologies
   3.1 Protocol
   3.2 Professional profiles
4. Reveal the potential of this research in the company
5. Determine the factors that will normalize commercial research

A search was conducted in Scopus under the keyword "Metaverse" and filtered by discipline: psychology, medicine, decision sciences and neurosciences. From 1 January 1995 to 20 July 2022, a total of 68 publications were obtained. It was found that there are no articles that address, from the business approach and commercial research, the potential of neurophysiological techniques in the metaverse, VR/AR. In addition, the *websites* of 21 neurotechnological startups listed by CBInsights (2019) and the 52 members of companies of the Neuromarketing Science & Business Association (NMSBA) were analyzed.

In addition, seven experts in cognitive neuroscience, computational science, artificial intelligence and neuroarchitecture are interviewed, most of them with research in VR and the use of neurophysiological technology. The semi-structured questionnaire is designed on the basis of previous research by the authors on metaverse and neuroscience (Crespo-Pereira *et al.,* 2023), and the questions emanate directly from the objectives described. Interviews were conducted online in the fourth quarter of 2022. One was replied to by email. Once concluded the round of interviews the responses have been anonymized and presented randomized in Table 1.

The study addresses the five quality parameters of Miles *et al.* (2013): objectivity/confirmability (a system of categories and codes is established and MAXQDA is used); reliability/confidence (foreign studies are considered for theoretical dialog and the final manuscript is shared with experts for its review), credibility/authenticity (triangulation of methods—interviews, documentary analysis and bibliographic review—unify, clarify and solidify the results), transferability/adequacy (conclusions are commercially applicable in multiple fields), utilization/application (a potential phenomenon involving present and future business activity is analyzed).

Table 1
Experts

Name	Affiliation and field of knowledge
Senén Barro	Director of the CITIUS-Unique Center for Research in Intelligent Technologies of the University of Santiago de Compostela Artificial intelligence
Juan Jesús Torre Tresols	ISAE-SUPAERO Neuroscience, BCI, artificial intelligence
Juan Luis Higuera Trujillo	Polytechnic University of Valencia Architecture; specialization in neuroarchitecture
Dulce Milagros Rivero	Pontifical Catholic University of Ecuador-Sede Ibarra Artificial intelligence
Rob Cecilio	CEO Dendron Neurotechnologies Computational neuroscience
Irene Alice Chicchi Giglioli	Polytechnic University of Valencia Clinical psychologist
David Glowacki	CITIUS researcher Virtual reality and computer science

Results

First Perspective: Neurophysiological Technology in Metaverse Devices

The most advanced technological state aims at the communication of the mind with the machine by using the brain-computer interface (BCI) thanks to the EEG (Ning *et al*., 2021; Park and Kim, 2022). EEG, the classic neuroscience technology (Ning *et al*., 2021; Park and Kim, 2022) and the most used in the development of BCI (Barrios *et al.,* 2017; SSVAR, 2022), employs scalp-based sensors for the recording of neural activity (Cinel *et al*., 2019) and facilitates the encoding and decoding of brain signals and sending orders to devices.

The BCI-EEG is used today in VR environments to know the functioning of the brain and create therapies to restore mobility and sensations in patients with severe disabilities (Lebedev and Nicolelis, 2017), in addition

to its ability to allow simulations and experiments on cognitive processes in a controlled laboratory context (Cannard *et al*., 2020) and attractive to motivate the subject (Barrios *et al.,* 2017).

The existence of portable, inexpensive and non-invasive neurophysiological technologies could drive commercial applications (SSVAR, 2022; Lee and Kim, 2022; Park and Kim, 2022; Rauschnabel *et al.,* 2022; Riar *et al.*, 2022) (Table 2). Non-invasive BCIs open the door to their mass consumption in the metaverse field, beyond the sanitary application (SSVAR, 2022). Some authors consider that the BCI is called to form the third foundation in the construction of the metaverse (Brambilla-Hall and Baier-Lentz, 2022).

The technology (BCI-EEG) can be used together with *the head mounted displays* (HMD) of VR/AR/MR. in various educational and leisure activities: video games (Idun Technologies, n.d.), entertainment and communication (Ienca and Andorno, 2021). Pioneering initiatives show their interest in the mass market. Meta (formerly Facebook) proposed creating, in collaboration with UCSF, a non-invasive BCI helmet to redefine the AR/VR experience (Makin *et al.,* 2020; Tech at Meta, 2020). For Meta, the future of metaverse is found in the sciences of perception and AI and mixed reality with haptic devices, hand tracking and eye-tracking (CNET Highlights, 2022). Other technologies have developed gloves, bracelets and bodysuits to enhance the user's sense of touch and emotions (Park and Kim, 2022; Tayal *et al*., 2022).

Gesture and voice recognition, thermal and haptic detection systems will facilitate the feedback needed to provide higher levels of immersion in virtual environments (Shepard, 2022). With thermal haptics, users will be able to feel the temperature of a virtual object and have a more realistic interaction with their environment; while with ultrasound-based haptics, pulses produced by special speakers will create skin-sensitive pressure points. It will be applied in video games, vending machines*,* shopping kiosks… (Shepard, 2022).

Eye *tracking*, an eye tracking technology that records, among others, movement and attention patterns, is incorporated into headsets (Egliston and Carter, 2021b) and facilitates optimization in experience design (Rogers, 2019).

Metaverse virtualizes and dates the movements of the individual to translate physical experiences into virtual ones (AEDP, 2022). The Internet of things and neural interfaces act as a bridge for physical-virtual interaction (AEPD, 2022). Technologies to enrich sensory experiences (auditory, haptic, visual, olfactory…) (Egliston and Carter, 2021b) provide neurophysiological information of potential interest for commercial research.

Table 2

Metaverse devices and neurophysiological recording sensors

Technology	Built-in sensors
HP Reverb G2 Omnicept Company: HP	It includes a system of *eye tracking* sensors, *face tracking* and *heart rate* in the HMD.
Spectacles Company: Snap	AR glasses. NextMind, a developer of BCI-EEG and *eye tracking*, belongs to Snap.
Oculus Quest 2 Company: Meta	It has body motion recording sensors, an accelerometer and a gyroscope. Meta works on a wrist interface, an electromyography (EMG) bracelet, to detect motor neurons that signal the intended movement of the fingers.
AR glasses Company: Google	They include facial recognition.
Magic Leap 2 Company: Magic Leap Inc.	AR glasses with *eye tracking* cameras. Professional and industrial orientation.
PSVR Company: Play Station	VR glasses have sensors for movement and *eye tracking*.
Hololens Company: Microsoft	MRI technology that uses holograms. Introduces accelerometers, gyroscopes, *eye tracking* and *voice tracking*. Educational and health use.
Galea Company: OpenBCI	MR. BCI-EEG helmet. Integrates EMG, EEG, EOG, EDA, PPG, ET into one device.
Vive Flow Company: HTC	They incorporate *eye tracking* (Tobii). Consumer and professional market. Designed for entertainment, *gaming*, metaverse, sales/ marketing, *training*, learning.
Valve Index Company: Valve	It has an accelerometer, gyroscope and motion sensor for a more realistic effect of interaction with the virtual world. Designed for VR games.
Samsung Gear VR Company: Samsung	Goggles for video games and audiovisual content. It has *eye tracking*, *hand tracking* and facial recognition.
Apple Glass Company: Apple	VR glasses. They are expected to incorporate 14 cameras, some to detect facial expressions that allow their representation in an avatar.
Canon MREAL X1 Company: Canon	Augmented reality glasses. It has *hand tracking*. Professional/ business use.

Note. Own elaboration from Angelini *et al*. (2022), HP (2022), CNET (2022b), Spectacles (2022), Marquez (2022), Spectacles (2022), Bezmalinovic (2022), Leswing (2022), Magic Leap (2022), Abraham (2021), Hololens (2022), Bitnamic (n.d.), Schneider (2022), Brown (n.d.), Galea (202 2), López (2022), HTC (2022), Valve (n.d.), Carter (2022), Muñoz (2015), Miller (2017).

Perspective 2: Neurophysiological recording technology and commercial research

Research possibilities in VR/AR environments

VR/AR *hardwares* with integrated neurophysiological sensors may be in regular use in the future. Currently there is evidence of its implementation, at least in an operational manner (Table 3). These sensors open a methodological way around techniques and metrics that eliminate the biases of techniques that depend on verbalized response (Dincelli and Yayla, 2022). Opinion shared by the interviewees (E1, E3).

Experts point to a wide range of technologies in the field of neuroscience and psychology in the study of the subject. The possibility of incorporating a wide variety of sensors to helmets and VR devices (EEG, ECG, EDA…) (E1, E2, E7) is indicated. In addition, there are a large number of *wearables* in the consumer market (e.g. smart watches…) that record physiological data and identify mood; these could be combined during the use of metaverse for studying the subject (E1).

Research with neurophysiological sensors is possible in the laboratory, but its application in real scenarios of use must overcome certain obstacles (E1, E2, E3, E4, E6, E7).

- There is great variability in the reliability of the sensors incorporated in existing devices (E2, E7), however, HTC Vive helmets are used in laboratories because of the quality of their sensors (E5).
- The devices weigh a lot and may cause a headache (E4).
- Better sensors needed – reliable, cheap – (E2)
- Appliances must be properly placed (E2, E3, E7)
- Progress is needed in AI (E2) and *machine learning* (E7), as well as in signal filtering that ensures the business usefulness of data (E2, E2, E7).

Table 3
Neurophysiological recording technologies applied in VR/AR devices

Technology	Registration
Accelerometers	It records body movement (arms, hands, fingers) as well as postures using sensors. It is implemented in *wearables* like *smartwatches* to offer information search, entertainment or *healthcare* services. A pioneering example is Microsoft's Kinect, which employed motion interfaces, new forms of interaction in virtual worlds.
Electrocardiogram (ECG)	The electrocardiogram records the electrical activity of the heart, heart rate (HR), heart rate variability (HRV).
Electrodermal activity (EDA)	This technique measures electrical conductivity mainly through sweating of the skin. It is useful for measuring emotional reactions and stress.
Electromyography (EMG)	Electromyography measures muscle contraction. Another derivative technique is facial EMG, which records the movements of facial muscles in order to determine emotional states.
Electroencephalogram (EEG)	It records neural electrical activity. It is used for CCBs.
Eye tracking (ET)	It records the gaze, fixations, saccadic movements, pupil dilation, blinking rate. It is used to analyze cognitive processing (attention), used in marketing studies, usability and *human-computer interaction*.
Breathing (RESP)	It records respiratory activity, respiratory rhythm.

Note. Own elaboration from Dionisio *et al*. (2013), Angelini *et al*. (2022), Halbig and Latoschik (2021), Gakhal and Senior (2008), Ohme *et al*. (2011)

In addition, not all sensors provide deep information on emotional and cognitive processes; for this reason, EEG should be incorporated, thus making research extraordinarily complex (E2, E3, E7). The idea that this technology can "read the mind" is a fallacy (E2). Today, research in real environments using VR with EEG poses methodological problems to be overcome (E7):

- Variability in reliability and validity in the off-laboratory data recording (E2, E3, E7).
- Data recording in noise, motion… (E2, E3, E7) and filtering of strange variables (E2, E7).
- Reliability of commercial EEGs (E2, E7).
- Connectivity of non-invasive EEGs without gels (E2).
- The quality of the electrodes circumscribed to the frontal areas and the usefulness of this information (E2, E7).

- BIC-EEG ergonomics with AR/VR (E3) devices.
- The complexity of handling EEGs (E2, E7) and their proper placement (E2, E3, E7).

Emotional and cognitive recording

The Academy has reported a high volume of work that employs physiological metrics in VR environments to understand the cognitive and emotional processing of the human being before certain stimuli (Venkatesan *et al.,* 2021). Studies on neurophysiological and VR technologies focus on the creation of methodologies and systems for recognizing evoked emotions (Marín-Morales *et al.,* 2018). Research on affective/emotional states in immersive virtual environments with physiological data is relatively new and growing (Marín-Morales *et al.,* 2018; Dozio *et al.*, 2022). This is highly relevant as emotions affect behavior (Mandolfo *et al.*, 2022). Virtual reality environments simulate real-world scenarios and offer various sensory inputs measurable with neurotechnology (Parsons and Duffield, 2020). The virtual worlds thus become spaces of interest for companies linked to retail, fashion, media, education or tourism.

There is a wide range of technologies applied in the study of emotion in the context of virtual reality: EEG (in the form of a *headset* or as a textile electrode), pupilometry, EDA… (Halbig and Latoschik, 2021; Marín-Morales *et al.,* 2018). Traditionally, the emotional states before stimuli have been measured according to a two-dimensional system formed by valence and *arousal*. While valence demonstrates the degree to which a response is positive or negative, *arousal* measures the degree of activation associated with an emotion (Bolls *et al.*, 2001).

Real-time psychophysiological data recording provides information regarding cognitive states (Marín-Morales *et al.,* 2018). Classical approaches in VR experience assessment tend to employ physiological measurement devices to monitor attention, stress, meditative state (Orlosky *et al*., 2021), anxiety, cognitive load (Halbig and Latoschik, 2021). These are applicable in: therapy, training and simulation (Angelini *et al.*, 2022), learning, entertainment and communication (Halbig and Latoschik, 2021).

Several technologies, such as *chest bands* and bracelets have been used to record stress, providing relevant data on skin conductance and cardiovascular information. Body temperature, breathing, movement, and ECG are also

part of this type of study. Cognitive load indicates how demanding a task can be and, therefore, the mental effort invested in an activity.

This is particularly interesting in the field of simulation and learning in VR environments. Studies with EEG and EDA monitor various levels of cognitive load. The *wearable* bracelets also provide interesting cardiovascular information to assess load levels. EEGs are the most used to assess this aspect. Other studies also show the effectiveness of *eye tracking* and eye measurement, being especially relevant given its implementation in HDM (table 3). Anxiety can be monitored with sensors for cardiac variability, body temperature, skin conductance, and EEG (Halbig and Latoschik, 2021).

Using physiological data in the context of VR would facilitate research such as (Halbig and Latoschik, 2021):

- Comparison of physiological responses in virtual versus real scenarios.
- Comparison of groups by differences in physiological reaction.
- Process analysis by monitoring physiological changes in virtual simulations.
- Analysis of progress through the identification of changes in response to the same stimulus in multiple exposures.
- Correlations and establishment of relationships between the measurement of variables.
- User rankings based on responses/segmentation.
- Visibility of unconscious and latent processes.
- Adaptation of the contents to the user according to indicators of effort and stress.

Applications and benefits of neurotechnology for the company

The functional benefits of neurophysiological technology (B.F) for metaverse support and those derived from user research (B.I.) with neurophysiological techniques are listed below (Table 4).

Table 4
Benefits of Neurophysiological Technology

	B.F.	B.I.	Source
Physiological sensors in commercial *headsets* will enrich emotional interactions	x		(Angelini *et al*., 2022)
Eye tracking and facial recognition add verbal and non-verbal cues in the creation of digital avatars that better represent emotional states	X		(Halbig and Latoschik, 2021) (Angelini *et al*., 2022)
Eye tracking as a subject identification system. Recognition of preferences and customization of environments	X		(Rogers, 2019)
Identifies user presence	X		(Halbig and Latoschik, 2021)
These technologies enable user-friendly designs that enhance experiences		X	(HP, 2022) (Halbig and Latoschik, 2021) (Rogers, 2019)
Identification of attentional and distracting patterns through *eye tracking*		X	(Halbig and Latoschik, 2021) (Rogers, 2019)
Assessment of the effectiveness of the scenarios and their emotional impact (therapies…)		X	(Halbig and Latoschik, 2021)
The emotional *feedback* can revert in the self-regulation/feedback of contents and derives from the game for its efficiency in relation to training and well-being		X	(Angelini *et al.*, 2022) (HP, 2022) (Halbig and Latoschik, 2021) (Rogers, 2019)

Eye tracking systems or absolute positioning in real environments can be employed for a host of applications, including those related to marketing or consumption (E6). These technologies allow users to identify and create profiles of users with behavioral patterns (E1, E6), which would facilitate personalized recommendations (E1, E2, E3). The tandem they would form with AI and machine learning would ensure behavioral prediction thanks to the high volume of data potentially collected with the sensors (E1, E2, E5, E6).

On the other hand, the suggested methodology could become relevant in the design of contents/*inputs* and the optimization of the mood by quantifying the emotional effects before stimuli shown in immersive virtual environments (Marín-Morales *et al.,* 2018). In the metaverse, the identification of emotions is crucial for avatars to emulate human beings, since they must learn to express emotions (E1). Thanks to the physiological record, users will

be able to know what excites, stresses, calms … and stimulates in one way or another (E1). Other potential benefits:

- Reliability and objectivity of investigations (E3).
- Identification of the most effective (liked and disliked) and attractive content (E1, E2, E3, E4) for any field – education, media, advertising – (E1).
- Content customization/advertising/educational (E1, E2, E3, E4).
- Design of various environments such as educational (E7) as well as *retail* and product placement (E1, E5).
- Secure access to platforms through biometric identification (E2).

State of the art on commercial studies

Neurotechnologies develop innovative technologies in the field of neuroscience. The companies analyzed allocate these resources in VR environments to relieve chronic pain, cognitive rehabilitation, and motor. Few evidence their relationship with *gaming* and/or commercial research (Kernel, Brain CO., Emotiv, Neurable, BitBrain technologies, NextMind, MindMaze); and fewer that are applied in VR contexts (table 5).

Table 5
Neurotechnology and its business relationship

Company	Description and application
Kernel	It develops neuroimaging (EEG) technology and it is applied in VR studios in areas such as *gaming,* entertainment, and consumer products.
Dreem	Neurotechnology to monitor brain activity during sleep.
Thync	Development of a neurostimulator to combat stress, anxiety, tension and improve sleep.
Halo neuroscience	Development of technology for neurostimulation and mental health. Company purchased by Flow Neuroscience.
Synchron	It develops invasive BCI, Stentrode to be used by patients with paralysis.
Brain Co., Inc.	It has a *wearable* BCI and *headbands* for education, fitness and video games.
Neurable	It develops BCI. It targets the AR/VR gaming industry. In 2017 it introduced the first mind-controlled virtual reality (VR) game.

Company	Description and application
Neuralink	It develops invasive BCI.
Flow neuroscience	It develops an earpiece that provides transcranial direct current stimulation on the forehead to treat depression.
Cognixion	It works with BCI, AI and AR for people with communication difficulties.
Bitbrain technologies	Spanish company that creates neurotechnology and offers consultancy (neuromarketing).
Paradromics	It creates invasive BCI technology for people with communication difficulties.
Meltin MMI	A Japanese company that develops cyber augmentation technologies, including a "cyborg" hand called MELTANT-α. It works in the processing of biosignals.
Neuros Medical	Biomodulation company focused mainly on pain relief.
NextMind	It develops BCI and targets the consumer market.
Emotiv	It creates hardware and software for medical and business use.
Q30 Innovations	Aimed at athletes and military personnel; its main product is the Q-Collar, a wearable device designed to protect the brain.
BIOS	Company of neural interfaces destined to control prosthesis.
Neuroscouting	Sports technology focused on analyzing the performance of athletes and trying to predict their potential.
NeuroPace	It develops medical technologies to reduce epileptic seizures.
MindMaze	It employs gamification and VR to help with neurorehabilitation.

Of the 52 members of the NMSBA, only two allude to the use of neurophysiological sensors in VR. Tobii performs attention studies (ET) in VR scenarios that allow:

- Avoid the use of highly complex physical scenarios.
- Reach a high sample.
- Control digital spaces and adjust to *packaging* and store design requirements without the need for their physical version.
- Analyze digital images.

Tobii (n.d., n.d.b) wants technology to be useful for creating realistic avatars and intuitive interfaces and as a tool for authentication. It sees social apps and games as the areas where consumers will appreciate the metaver-

se the most. Neurons (n.d), on the other hand, is analyzed through an EEG *headset*, a VR conversation *versus* in-person conversations. Similar levels of emotional *engagement* were demonstrated in both cases. VR has been hailed as the next big thing.

Benefits for the user

Interviewees point to the value of VR and neurophysiological sensors for research in laboratories and for health/education/social purposes. Virtual environments would enable user diagnosis and rehabilitation (E2, E3, E4, E5). EEG in a VR scenario is used today to detect anxiety and potentially depression (E2, E3). Virtual reality could propose stimulating content and designs for the well-being of the user (E3, E7) and boost the feeling of social connection highly beneficial for the subjects (E4). AI would simplify users' lives by providing data on health status and information relevant to decision-making (E1).

Investigation Protocol

Currently, subjects share personal and behavioral data through their mobile, social networks and *wearables* (E1, E4, E7). The human body becomes a technological platform; the internet of things is now moving to the internet of bodies, full of sensors to collect data in real time (E1).

The recording of data with neurophysiological sensors would not differ from the current Meta model or similar ones (E1). Metaverse is designed to collect data, and the inclusion of neurophysiological information could enrich this "data emporium" (E1). Metaverse could become an ideal platform for research outside the laboratory due to its high volume of volunteer participants in realistic and unpaid environments (E1, E3).

The existence of *hardware* with integrated sensors and *software* is a necessary condition for research in real environments. At login, the platform could register various metrics of commercial advantage (E1). Neurophysiological information is at the highest level of legal protection (E2). The express consent of the user, prior registration of data by third parties is mandatory (E1, E2, E3, E4, E5, E6). While European legislation is highly warranted, US legislation could be looser in coverage (E2). It is remarkable how easily users authorize the sharing of their data to access *online* content (E1, E4).

The consent will depend on the interest aroused by the content (E3) and the ownership will always be of the individual (E2, E4); however, once the developer of the platform anonymizes the data and treats them collectively, they will be their property (E1; E2; E3). The way this data is used will be relevant. Its purposes must be the right ones (E1).

It should be clarified that collecting data in a real-world scenario is a complex task (E2, E3, E4, E5, E7). The collection itself could present insurmountable obstacles at present (see 3.2.1.); to this is added a basic methodological question, the design of the investigation (E2, E3, E7), which must attend to each particular case (E7). The objective (E2, E3, E6, E7) and the appropriate techniques for that purpose (E2, E3, E7) should be defined. It is necessary to specify the actions to be analyzed and select some markers that are perfectly synchronized and identified and facilitate the collection of data, whatever they are (e.g. the look) (E2, E3). These markers should be consulted and agreed with experienced experts to identify stakeholders who are interested in analyzing and providing valuable information and thus help to draw valid conclusions (E3). When the data is collected, it must be cleaned and labeled (*data labelers*) to create a database to work with from the AI (E1, E3). Thanks to this process it will be possible to identify cross-sections of the entire sample in the same situation (E2, E3) and establish behavior dynamics (E1, E3). The categorization of subjects into patterns will facilitate decisions on content management, informed and linked to the possibilities offered by AI (recommendations, customization …) (E1).

It is unquestionable that research should adhere to scientific protocol. Data interpretation should be rigorous (E2, E3, E7), thus, we should not fall into reductionism (E2). Today, the challenge for the scientific community is to obtain, through this type of records, clear indications about what happens, so that the exit from the laboratory is, at least, complex (E2, E3, E7). However, it is pointed out that research with video games is highly appropriate, because it is framed in controlled scenarios and has hard rules that limit actions and action spaces (E3). If a platform wants to conduct research in its digital gaming environments it will be able to implement challenges, levels and activities (E3). Suggested research might be a bit easier for developers with their own *hardware* and *software*, as the independent researcher should separately process consent from users and from *hardware* and *software* developers (E3).

Professional profiles

The professional team formed for commercial research should be the same as the one created for an academic research (E7). Teams outside the scientific/academic community may not adhere to the scientific protocol (E7). Although the team should not be formed without first identifying the problem to be solved (E4, E6, E7), the following profiles potentially involved in an investigation such as the proposal are suggested:

- Specialists in cognitive neuroergonomics, physiological ergonomics (E3).
- Robotics experts (E6).
- Engineers able to write code; *software* engineers (E4).
- Graphic artists to design VR environments (E4).
- Expert in cognitive modeling (E2).
- Experts in extended reality (E6).
- Experts in *big data* (E6), mathematicians, statisticians (E1, E2), *data scientist* (E1, E2).
- Experts in AI, *machine learning* (E1, E5, E6, E2), *data labellers* (E3).
- Computer vision experts (E6).
- Expert in physics for signal processing (E2).
- Biomedical engineers for handling sensors (E4).
- Neuroscientists or biomedical engineers for data interpretation (E1, E2, E4).
- Expert in Cognitive Sciences (E2) and Computer Science (E2).
- Psychologists or *coaches* expert in leading group processes (E4, E2).
- Experts in the area of research interest: Marketing, Communication, Education, Fashion… (E1, E2, E4, E5).

Future of commercial research

Just as social networks evolved under the cover of new commercial applications, metaverse could experience a similar situation. The company must identify the potential of these tools and create products tailored to their needs (E1). Once the product is launched, *software* developers will create products and AI will demonstrate its capabilities (E1), but first metaverse must become a reality (E1, E2, E3, E4, E5). Its normalization depends on the cost and democratization of VR glasses, among others (E1, E2, E7).

Neurophysiological investigation in the metaverse under conditions of real use is theoretically possible. Some do not doubt its future commercial interest (E1, E6, E7), although much remains to be done (E2, E3, E7). VR/AR/MR. has improved exponentially in recent years, both the *hardware* (more economical, powerful, sensorized, robust…), as well as the algorithms and *software* available – even free to use – (E6). However, the leap from laboratory to home will require a major technological and scientific leap (E2, E3, E7) (see 3.2.1.). There is a gap between the expectations created and the results achieved today, caused by the claims of certain circles, media and the exercise of neuromarketing (E7).

Interest in this methodology will depend on the success of metaverse (E1), the recognition of its potential (E1) and its ability to generate business/social/educational benefits (E1, E3). This requires leading and innovative companies that lead the way and then join others: SMEs and research groups (E3, E6). Big tech companies like Meta and Google have resources, but not all of their proposals are successful (E3, E4). Interest in virtual worlds is not new. We would be looking at the third attempt to promote experiences linked to VR/metaverse (E4). The user will not be interested in them as long as they have everything they need on their smartphone (E4) and do not offer experiences other than reality (E4), because the physical experience will never exceed the virtual one (E5). In spite of the million-dollar investment in metaverse, it seems that the projects of Meta and other technological projects (E3, E4, E5, E7) do not take off. The stock market value of technology companies at the end of 2022, shows, at least, an uncertain future (E4, E5, E7).

Conclusions

Big tech companies have integrated non-invasive neurophysiological sensors (*eye tracking*, EEG…) into VR/AR *headsets* and peripherals. Although this technology is necessary to support VR/AR systems, the *feedback* it provides would have the potential to know the emotional and cognitive states of the user without the biases of verbal responses and in real-world environments of use. These technologies could lead to high-interest metrics in multiple fields (such as education, business…) and that provide large-scale benefits. At the moment, science and technology is not ready to deliver reliable results in non-laboratory settings. However, their business interest is

evident. AI will become highly relevant in the exploitation of data, including for those arising from the neurophysiological registry, and in the creation of recommendation and personalization systems. Ethics and privacy become one of the great challenges of this type of metaverse research. Future approaches should include the perspective of the company and consultancies specialized in metaverse.

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Instagram as a digital tool for communication and positioning of fashion brands: A case study in Ecuador

Instagram como herramienta digital para la comunicación y posicionamiento de marcas de moda: estudio de caso en Ecuador

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Abstract

The present study examines Instagram as a strategic tool for communication and brand positioning in the fashion industry, focusing on the accounts of Ropa Gallardo and Afrikana. This research is justified by the rise of digital marketing and the need to design effective strategies on visual platforms like Instagram, which have redefined interactions between brands and audiences. The objectives are to analyze the communication strategies implemented, identify the most effective tactics, and evaluate the impact of these actions on market positioning.

The adopted methodology is mixed, combining quantitative and qualitative analyses. Over 2,400 posts from both brands were examined between 2023 and 2024, analyzing variables such as content formats, posting frequency, hashtag usage, and interaction rates. The analysis focused on identifying engagement patterns and the effectiveness of the implemented strategies.

Among the findings, Afrikana stood out for achieving higher engagement proportional to its follower base, driven by the use of formats such as Reels and personal narratives. Ropa Gallardo, despite having a larger number of followers and posts, showed a lower interaction rate. Afrikana recorded a 67,6% increase in its follower base, while Ropa Gallardo grew by 5,6%. The study concludes that the use of emotional narratives, storytelling, and collaborations with influencers are essential to enhancing engagement and brand positioning.

Keywords

Instagram, marketing, digital communication, engagement, narratives, influencers, fashion, brand positioning.

Resumen

Esta investigación aborda el análisis de Instagram como herramienta estratégica para la comunicación y el posicionamiento de marcas de moda, tomando como objeto de estudio las cuentas de Ropa Gallardo y Afrikana. Este trabajo se justifica por el auge del marketing digital y la necesidad de diseñar estrategias efectivas en plataformas visuales como Instagram, que han redefinido la interacción entre marcas y audiencias. Los objetivos planteados son analizar las estrategias comunicativas implementadas, identificar las tácticas más efectivas y evaluar el impacto de estas acciones en su posicionamiento de mercado. La metodología adoptada es de tipo mixto, combinando análisis cuantitativo y cualitativo. Se examinaron más de 2400 publicaciones realizadas por ambas marcas entre 2023 y 2024, analizando variables como formatos de contenido, frecuencia de publicación, uso de *hashtags* y tasas de interacción. El análisis se centró en identificar patrones de *engagement* y efectividad de las estrategias implementadas. Entre los hallazgos, Afrikana destacó por un mayor *engagement* proporcional a su base de seguidores, favorecido por el uso de formatos como *Reels* y narrativas personales. Ropa Gallardo, a pesar de su mayor número de seguidores y publicaciones, mostró una tasa de interacción menor. Afrikana registró un crecimiento del 67,6 % en su base de seguidores, mientras que Ropa Gallardo creció un 5,6 %. La investigación concluye que el uso de narrativas emocionales, *storytelling* y colaboraciones con *influencers* son fundamentales para potenciar el engagement y el posicionamiento de marca.

Palabras clave

Instagram, marketing, comunicación digital, engagement, narrativas, influencers, moda, posicionamiento de marcas.

Introduction

In a context of accelerated changes conditioned by immediacy and participation (Sidorenko-Bautista *et al*., 2021), social networks are important digital tools for communication and brand positioning, making individual and collective experiences visible (López *et al*., 2023; Pérez-Rodríguez *et al*., 2022). In this sense, it is considered that benefits such as the creation of communities, interactions, participation with the establishment of strategies, among others, contribute to the positioning and recognition of the brand (Pacheco-Montúfar, 2021; López *et al*., 2023).

In addition, the characteristics of the digital culture of the audiences –acquired and derived from previous processes–the way in which they negotiate, disseminate and position their identity and sense of belonging in the different digital platforms (Pérez-Rodríguez *et al*., 2022; Barredo *et al*., 2020) are added, which allows decision-making processes to be motivated by their level of participation and interaction in the platforms. In this context, the influence of social networks covers all types of market and its relevance is not alien to fashion companies (Villena *et al*., 2020).

Taking as a basis that the characteristic of fashion is associated with a process of individualization and socialization: "it is a means to differentiate from others and a way of sharing socially" (Pacheco-Montúfar, 2021, p. 21), in addition to being related with cultural aspects that coexist in a consumer society (Pérez-Curiel and Sanz-Marcos, 2019). Therefore, narratives constantly aim to innovate and update according to new demands, with multimedia and interactive formats (Sidorenko-Bautista *et al*., 2021), since communication in social networks is mainly "visual, connective and interactive" (Pérez-Rodríguez *et al*., 2022, p. 3). Thus, it can be said that the visual experience is one of the key factors in the purchase decision and *engagement* process. Following this idea, studies show that users take images and videos into account (Pacheco-Montúfar, 2021, p. 30) However, other studies, such as Velar-Lera *et al*. (2019) show that some luxury brands still do not design specific strategies to act on social networks such as Instagram, sharing images, for example, expressionless.

It is evident that sometimes the importance of the visual as a basic aspect of the content is forgotten, being more important the adaptation to the immediacy and speed of digital changes. In this sense, this study seeks to evaluate the use of Instagram as a digital tool for communication and posi-

tioning of fashion brands called Ropa Gallardo and Afrikana; OE1: Analyze the communication strategies used by Ropa Gallardo and Afrikana on Instagram, identifying the most effective tactics used in their publications and OE2: Determine the impact of these communication strategies on the positioning of both brands within the fashion market.

Communication and digital audiences

The digital era has transformed communication processes, thanks to the convergence and divergence of communicative environments that give rise to more interactive and diversified content, making audiences go from passive viewers to active users, who interact with companies that place a product on the web to be sold anywhere in the world (Millan, 2005; Castells, 2000). Therefore, the transformation of communication in the network society (Castells, 2000) leads to new forms of reception, dialog and production of content by audiences, which increasingly become producers and issuers of content (Orozco-Gómez *et al*., 2012). Spaces where the digitization of the contents produced by the industry modifies the consumption habits of the audience, since the user has become a multitasking person who: consumes content, seeks additional information about it, comments and values for other users (Lastra, 2016). But user activity does not end here, once it has commented and valued it also generates its own content to be shared on platforms, giving rise to the figure known as prosumer, having the ability to be an audience, producer, user and consumer (González, 2021).

All this context promoted by the network or information society occurs thanks to the existence of digital platforms that generate impact on social structures, transforming everyday life, communicative environments, and media practices (García, 2022). Although the outlook appears promising, the digital environment has created a generational gap between digital natives and migrants, and young people are usually self-taught in digital skills, but lack comprehensive media competence, all of which causes society to demand the need for literacy and inclusion mechanisms to address all the challenges of the information society (Sandoval and Aguaded, 2012; Díaz *et al*., 2022).

In addition to what was mentioned in the previous paragraph, the Covid-19 pandemic has further accelerated these changes, affecting media systems, content production and distribution processes (Piñeiro-Otero, 2022), becau-

se actions such as quarantine led many businesses to close their physical stores and maintain electronic commerce, mainly promoted by social networks.

However, continuing with digital audiences, these exhibit various characteristics and behaviors in their online presence, because the interactivity offered by digital media allows them to participate in various ways (Castillo, 2014), becoming a challenge for small, medium or large companies that seek to attract potential consumers of their brands.

Thus, social networks consolidate a change within the traditional communicative paradigm (Villena *et al*., 2020, p. 97), with characteristics such as interactivity, immediacy, usability, among others; above all highlighting that digital "brings together different senses (hearing, sight, touch) and ends up transgressing them" (Pérez-Rodríguez *et al*., 2022, p. 4).

All this context of interaction and digital participation has made audiences identify themselves by immediacy and demand; in this sense, authors explain that "the *millennial* public warns of a scenario in social networks starring *influencers*, new leaders/opinion capable of conditioning the image of fashion and luxury brands" (Pérez-Curiel and Sanz-Marcos, 2019, p. 2).

Additionally, several authors agree on certain characteristics when it comes to consumer behavior within *e-commerce,* it is about: egocentrism, characterized by social acceptance through their purchases; hyperconnectivity, since all the time they are consuming information about brands and products; motivation and experience, because they act according to product details and previous experiences of other consumers, among others (Martínez and López-Rúa, 2016; Mercado *et al*., 2019), all measured by the cognitive and emotional responses to the brand (López and Ruíz de Maya, 2008). In short, it is digital marketing, promoted through the same networks that drives user interaction, influencing consumer behavior, interactions and purchasing decisions (Sarmiento-Guede and Rodríguez-Terceño, 2020).

In addition, user satisfaction and perceived hedonism are key factors in determining the intentions and behaviors of interaction with brands on different platforms and social networks (Casaló *et al*., 2017). Then, brands seek the participation of their followers or consumers by making the collective experiences visible, being that in some cases "these contents become a trend, generating dialog and debate, or in challenges that promote brands and influencers, thus constituting true digital cultures…" (Pérez-Rodríguez *et al*., 2022, p. 5).

Fashion marketing and communication on social networks

It is evident that social networks "have transformed the marketing landscape, hence affecting not only the commercial sphere, but even transcending cultural aspects such as social relations" (Pérez-Curiel and Sáenz-Marcos, 2019, p. 3). In addition to this, the capitalist characteristics of fashion and its direct relationship with consumerism (Jiménez-Marín and Elías, 2019) are added, since the philosophy of fashion demands constant innovation to be able to meet the flexible and changing needs of consumers (Martínez and López-Rúa, 2016), and in this environment the idea that companies effectively position their fashion brands on digital platforms becomes a real challenge.

Before the information society, companies were the ones who controlled their image, this being possible thanks to the unidirectional discourse, making the voice of consumers practically invisible (Cristófol *et al*., 2019). However, in an interconnected world characterized by immediacy, it is practically impossible to control the flow of information since the consumer acquires the characteristic of prosumer and sometimes influencer (Pérez-Curiel and Sanz-Marcos, 2019; Cristófol, 2019; Sarmiento-Guede and Rodríguez-Terceño, 2010).

If the aforementioned is combined with the accelerated growth of consumerism and diversity of tastes, fashion brands are obliged to evolve the communicational approach and adapt to what their audience demands, mainly under the premise that "what is consumed is not the object but the image it reflects" (Cristófol *et al*, 2019, p. 236).

And the way is clear, it is not enough to have a need or create it, once the product or service is invented/developed to meet the need, it must also be communicated to the target audiences (Paricio *et al*., 2019).

In addition, recent research shows that the frequency of online purchases increases every day, because users who bet on this modality do so influenced by the adoption of electronic commerce, the use of technology, the motivation to buy, among others (Ramírez-Lemus *et al*., 2024; Guaña *et al*., 2015).

It has already been understood that the fashion industry aims at digital marketing, which is developed strictly within the Internet, which according to López *et al*. (2023), there are three dimensions: "Content marketing, social media marketing and email marketing" (p. 2). It is precisely under the characteristic of *social media marketing* that the role of social networks enters (Jindal, 2020), since, through them, among other *benefits, communities can be created, interact with brands, participate in the establishment of strategies,*

achieve recognition, retain customers, engage the consumer, create attractive content, among others (Pacheco-Montúfar, 2021; Buenaño and Valle, 2022; Cabezas-Molina, 2024; León-Alberca et al., 2024; Rivera-Rogel *et al.,* 2020).

In addition, the multimodality of social networks is added, which "refers to the sound, visual, textual and iconic character of the language that characterizes these platforms" (Pérez-Rodríguez *et al*., 2022, p. 7), allowing to experience something similar to reality and multiplying the communicative action" (Barredo *et al*., 2020).

Consumers demand personal experience, i.e., what they perceive of that product, and that way is how the brand is built, obtaining the key messages to possess the component of the emotion-aspirational that is where this factor is concentrated to generate connections with individuals (Calvo, 2016; Pacheco-Montúfar, 2021). For this reason, the fashion industry is working every day to innovate in its digital marketing and promotion strategies, and some authors consider that Instagram is one of the most effective to respond to this need (Velar-Lera *et al*, 2019).

Instagram in the positioning and perception of fashion brands

Taking as a background that for the communication of brands in the digital environment, and more pointedly in social networks, it is important to highlight that the consumer is very perceptible and must be allowed to feel that the brand involves him/her and enters his/her life through the content received (Cristófol *et al*., 2019). For a brand to remain in time "it is necessary that it has a differentiated and relevant positioning in the mind of the consumer" (López *et al*., 2023, p. 1), otherwise it would become an advertising failure.

Although Instagram was created as a social network designed and used mainly by young people to share photos and videos (Campines, 2024), it is currently one of the platforms that has grown the most in recent years, mainly thanks to the fact that it has managed to merge the benefits of different social networks, becoming multiformat, i.e., with benefits such as: *Instagram story*, *Instagram reels*, suggested content for you, image posting with audio, geotags, stories and live videos, metric analysis, collaborations and alliances, among others (Pérez-Rodríguez *et al.,* 2022; Doval-Fernández and Sánchez-Aamboage, 20 21).

There are several benefits Instagram offers, and according to Kotler and Keller (2012) the success of the positioning of the company is achieved when

the brand is differentiated in the mind of the consumer. If taking this to a digital context, to develop a communication that is oriented to build the brand "it is necessary to know well the characteristics of the channel and produce characteristics that fit its uniqueness" (Velar-Lera *et al*., 2019, p. 5), without forgetting that a brand is more than a marketing strategy, it is about the link and constant relationship that is based on the perception and experience of the customer when interacting with it (López *et al*., 2023).

Some authors highlight the benefits of using Instagram to position fashion brands and achieve a good perception in their audiences, highlighting among them: 1) it creates a brand space that contextualizes communication 2) it allows listening and knowing the public 3) it promotes the creation of brand communities 4) it promotes the identification of brand prescribers 5) it promotes the direct interaction of users with the brand 6) it creates brand awareness 7) it helps identify points of improvement in content strategies 8) it promotes inclusion efforts (Velar-Lera *et al.,* 2019; Urrutia-Ramírez and Napán-Yactayo, 2021; Sánchez-Labella, 2021).

However, going back to Kotler and Keller (2012), it is necessary to take into account that in order for all these benefits to be perceived by the brands, authors such as Jai *et al*. (2022) mention the use of strategies based on transmedia narratives and user-generated content as an anchor to strengthen emotional connection with audiences. Fashion brands should focus on creating meaningful engagement experiences to foster customer loyalty: creating engaging content and active engagement with followers (Molina Prados *et al.,* 2022; Al-Haddad et al., 2023). Added to this is the constant updating, such as the use of artificial intelligence to know customers and motivate their purchase decision (Yeo *et al.,* 2022).

In short, Instagram is a key platform for fashion brands to interact with consumers and communicate their brand identity. The literature review shows that publications and the creativity that the public perceives through them can generate positive reactions and improve the levels of participation and feedback from followers (Casaló *et al*., 2021).

Emphasis is placed on the importance of visual content, innovation and emotional connection in fashion marketing, aiming at an intelligent use of Instagram to create loyal followers, obtain market intelligence and potentially increase sales by effectively communicating their identity and engaging their audiences/followers (Duarte, 2021; Carcavilla and Aguirre, 2022; Pachecho-Montúfar, 2021).

Materials and method

Taking advantage of the visual nature of the platform, these brands share attractive content with a clear objective: to capture the attention of users, generate interaction and strengthen their brand identity. In this context, this research focuses on a case study of the Instagram profiles of two Ecuadorian brands prominent in the fashion sector: Ropa Gallardo (@ropagallardo_ec) and Afrikana (@afrikana_ec). These accounts have been selected due to their relevance in the national market and the high number of followers that have managed to consolidate, being among the most influential in the country in this field. In addition, the brands represent relevant cases in the Ecuadorian market for their differentiated strategies in social networks. Afrikana focuses on niche audiences with aspirational content, while Ropa Gallardo prioritizes mass outreach.

The methodology adopted is the case method, defined by Yin (1994) as a suitable tool to analyze social phenomena that are not completely delimited. According to the typology proposed by Yin (1994), this work has a descriptive and exploratory approach. It is descriptive because it seeks to document and analyze the current strategies used by both brands on Instagram, including the type of content published, the techniques of interaction with users and the use of visual and narrative resources. At the same time, it is exploratory because it investigates the most effective tactics to achieve a better brand positioning, as well as the impact of these practices on the perception and loyalty of consumers. Based on this methodological framework, and following the recommendations of Yin (1994), the following research questions are raised:

Q1: How is Instagram used as a digital tool for the communication and positioning of fashion brands Ropa Gallardo and Afrikana?

Q2: What are the most effective tactics used in the posts based on engagement and engagement analysis?

Q3: How do communication strategies on Instagram influence brand recognition and consumer perception of Gallardo and Afrikana Clothing?

To meet these objectives and answer the research questions raised, a mixed approach is proposed, which according to Hernández Sampieri and Mendoza (2020), combines elements of the qualitative and quantitative approaches in a single study, allowing to take advantage of the strengths of both. This methodological design will include the analysis of data through a non-participant observation sheet. The factsheet will be used to examine

the type of content published by the brands Ropa Gallardo and Afrikana on Instagram from January 2023 to December 2024, selected as a recent and representative timeframe of the most recent updates of the platform (León-Alberca *et al.,* 2024).

The analysis will include key variables such as the type of content published (e.g., images, videos, stories or reels), the frequency of posts, the use of hashtags and the wording of the text (*copy*). These variables will allow to identify effective patterns and tactics, as well as their impact on the interaction and engagement of publications, contributing to the understanding of communication strategies and their influence on brand recognition and perception. The variables are detailed below:

Table 1

Research variables based on research questions

Research Question	Variable	Description
Q1	Frequency of publication	Number of publications made during the study period.
	Content types	Most used formats by brands (carousel, image and publications with video).
	Publication Schedules	Hours of the day and days of the week when brands publish content.
	Topics of the content	Analysis of the most used hashtags and their impact on the visibility of publications.
Q2	Rate of engagement	Average interactions per post in relation to the number of followers in the Top 50 posts. It identifies which publications have the greatest impact.
	Interaction by content type	Relationship between format (image, video, carousel) and level of interaction
	Mentions and labels	Use of mentions to users, influencers or collaborators.
Q3	Number of followers	Monthly growth in the number of followers as an indicator of audience attraction.
	User Generated Content (UGC)	Publications, mentions or labels made by users that reflect the impact of communication strategies on brand perception.

Results

In response to question 1, all publications made by both accounts during the study period were identified. The results show a total of 2469 publications, of which 483 correspond to Afrikana and 1986 to Ropa Gallardo. To analyze the monthly frequency of publications of both brands, the calculation of the monthly average was used. This is defined as the sum of a set of values divided by the number of elements in that set, being a descriptive measure that facilitates the analysis of general trends in temporal data (Moore *et al*., 2021). In this study, the monthly average was used as an indicator to standardize the frequency of publications and compare it in a uniform way, considering that the analysis period comprises 24 months (from January 2023 to December 2024).

The calculation of the monthly average is made by applying the following formula:

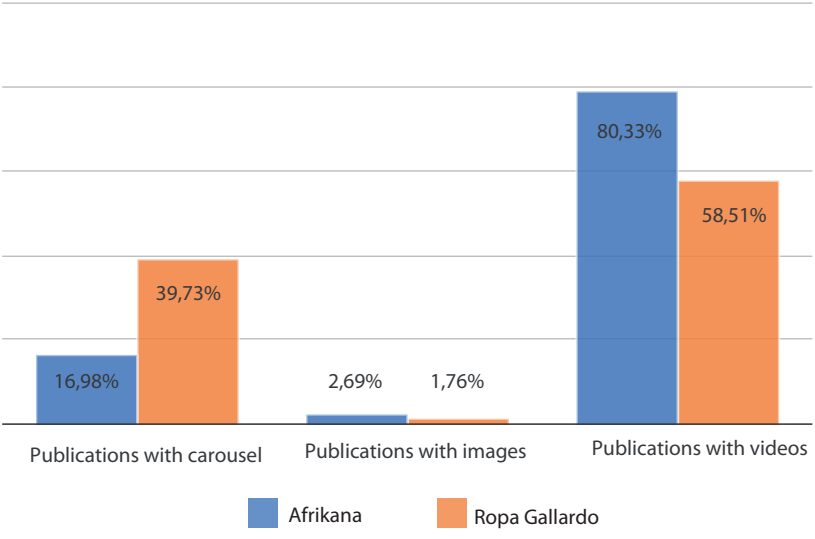
Figure 1
Monthly average publication formula

$$\text{Monthly average} = \frac{\text{Total of posts}}{\text{Number of months covered during the research period}}$$

Note. Own ó (2024) from Moore *et al*. (2021)

After applying the formula, the results reveal that the monthly average of publications is 20.13 for Afrikana and 82.75 for Ropa Gallardo. Regarding the type of content, there is a clear preference for video or reel publications, with 368 publications for Afrikana and 1162 for Ropa Gallardo, followed by carousel publications, with 82 and 789 publications, respectively. In contrast, static image publications have significantly less use, with only 13 publications in Afrikana and 35 in Ropa Gallardo.

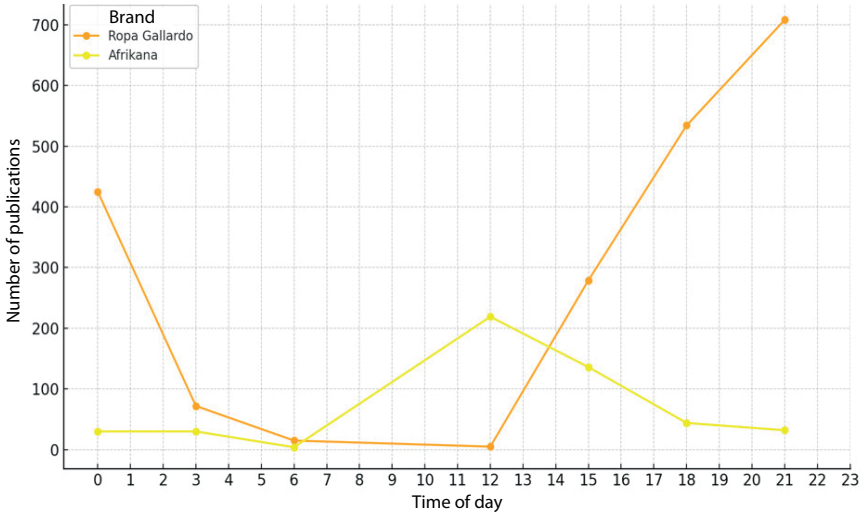
Figure 2
Format trend in Gallardo and Afrikana clothing publications during 2023 and 2024



Note. Own ó (2024) from the data obtained in Fanpage Karma.

On the other hand, the line chart shows the distribution of publications by time of day for the brands Ropa Gallardo and Afrikana during the analysis period. It is observed that Ropa Gallardo concentrates a significantly greater number of publications at times such as 15:00 and 21:00 hours, while Afrikana maintains a more balanced distribution, with peaks around 12:00 and 15:00 hours. This could reveal that brands identify these lapses as periods of more activity by their followers.

Figure 3
Trend of hourly publications of Ropa Gallardo and Afrikana during 2023 and 2024



Note. Own ó (2024) from the data obtained in Fanpage Karma.

To identify the predominant topics in the publications of the brands, an analysis of the 50 most recurrent hashtags in their publications was carried out. The results (see figure. 4) show that Afrikana mainly uses generic hashtags such as "#FyP" and "#FashionBlog", which provide fashion tips and suggestions on the use of different garments. Likewise, hashtags such as: "#HowToUse, "#OutfitInspiration", "#StyleInspo" and "#InstaFashion" reflect a focus on the added value that the brand offers, by promoting various forms of style and use of its products. These elements indicate a strategy aimed at positioning the brand as a benchmark in trends and style.

Figure 4
Trend of hourly posts by Ropa Gallardo and Afrikana during 2023 and 2024

Note. Own ó (2024) from the data obtained in Fanpage Karma.

For its part, Ropa Gallardo prioritizes the construction of brand identity through the repeated use of its name in hashtags, such as "#Gallardo", and highlights its new collections, for example, "#NewCollection". Additionally, it emphasizes geographical and origin elements, using hashtags such as "#Guayaquil" and "#HechoEnEcuador", reinforcing its link with the local context and its cultural roots. These findings reveal an important part of the direction of the strategies of these brands.

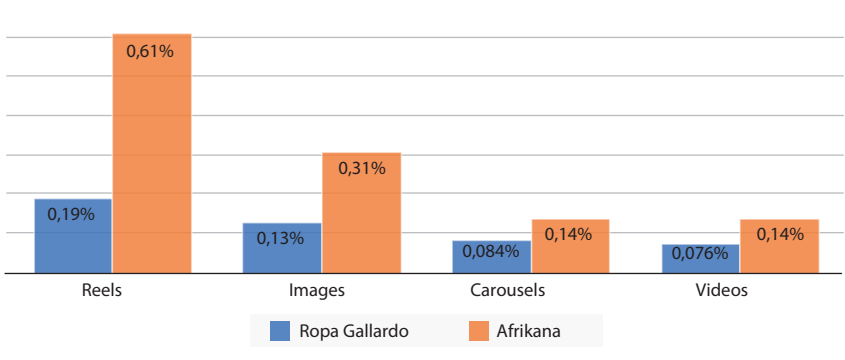
To answer question 2, it was essential to analyze the engagement rate achieved by brands during the study period. According to Ballesteros Herencia (2018), engagement is an interactive and two-way process that occurs between a subject and a digital platform, in this case, Instagram. This process includes a cognitive and emotional state that manifests itself in specific behaviors of the follower towards the profile, and that are evidenced through: "likes", comments and shares, which reflect different levels of involvement and intensity. To measure engagement, the sum of interactions is divided by the number of followers the account had at the time of posting. Then, the values obtained from all the publications are added. Finally, this sum is divided by the number of days of the analyzed period.

Figure 5
Engagement rate of Gallardo and Afrikana clothing publications during 2023 and 2024

Note. Own ó (2024) from the data obtained in Fanpage Karma.

An engagement rate of 0.37% (Afrikana) and 0.42% (Ropa Gallardo) indicates that, on average, less than 1% of the total audience (followers) interacts with the published content. Although this value could be considered low in absolute terms, it is essential to consider the particular nature of the accounts. These do not only depend on the interaction of their followers, but also generate participation through other sources, such as advertising campaigns, users interested in specific garments, or individuals attracted by specific content and various motivations.

Figure 6
Interaction rate by type of publication of Ropa Gallardo and Afrikana during 2023 and 2024



Note. Own ó (2024) from the data obtained in Fanpage Karma.

As shown in Figure 6, the results indicate that Afrikana has significantly higher interaction rates in all content formats compared to Ropa Gallardo, despite having a much lower number of followers. This finding suggests that Afrikana has a more engaged audience proportionally, which could be related to more accurate targeting, a more active community, or more relevant content for its target audience. In the case of Ropa Gallardo, the highest interaction occurs with reels (0.19%), followed by images (0.13%). Carousels (0.084%) and videos (0.076%) have considerably lower rates, indicating that these formats might not resonate as much with their audience. On the other hand, Afrikana stands out with Reels (0.61%) and images (0.31%), indicating a preference for visual and dynamic formats. Carousels and videos obtain identical rates (0.14%), which although lower are still higher than those of Ropa Gallardo in all cases.

In relation to mentions, labels and collaborations, it is important to note that in the case of Afrikana these practices are common. Most of the posts are made in collaboration with the account @VivianaPazmiñodesing (5858 followers), whose biography identifies her as the CEO of the brand. These actions give a more human image to the company, highlighting the human component behind it. On a recurring basis, this collaborator shows how to use and highlight the garments of the brand, aligning with the hashtags that Afrikana seeks to position on the platform. Additionally, Afrikana collaborates with various influencers, especially in the context of its sports line, where it establishes alliances with professionals in areas such as yoga, nutrition and lifestyle. Prominent profiles include @GabySuescum (20,100 followers), @GabyRecalde (54,100 followers) and @AndreanMakeUp (1.4 million followers), who contribute to the brand's positioning in specific market segments.

Gallardo Clothing, in contrast, uses mentions, labels and collaborations less frequently. However, it is important to note that the brand establishes alliances with other companies, promoting and marketing their products in their physical store. Some of these are: @CoolTherapy (30,300 followers), a store specializing in accessories; @Covesec_RopaDeportiva (28,000 followers), focused on sports apparel; @ColoryCool (16,100 followers), offering accessories linked to Apple devices, such as cases, wireless headphone cases and popsockets; and @BlankSpace.ec (7,284 followers), dedicated to skin care and makeup.

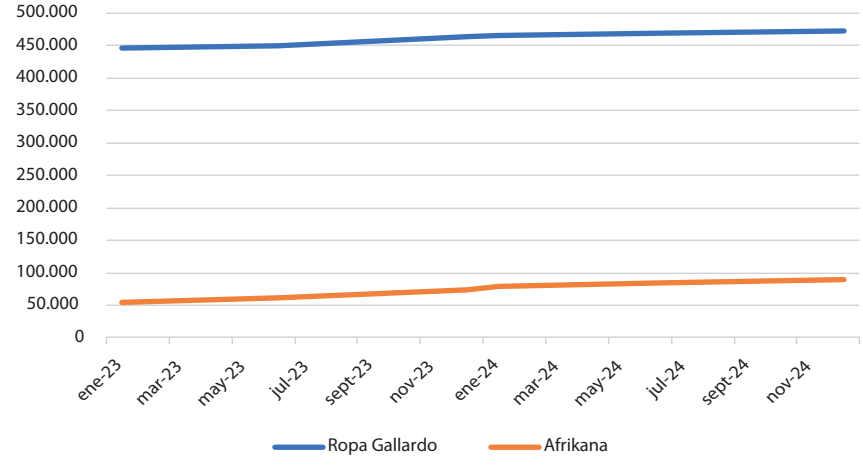
Regarding the collaboration with influencers, there is a limited participation, mostly linked to the store team. Some of these people identify directly with the brand, such as @MichelleGallardo (23,100 followers); @LilyGallardo (25,000 followers); In other cases, they include @AidaMatute (21,800

followers); @AllissonMatamoros (3,995 followers) and @NataliaZambrano (4,902 followers). It should be noted that one of the strategies they use is to call to action through *copies* that motivate the mention of more people, for example: "Your first @ owes you a Crochet dress!" In some cases they are about contests and in others they are simply about motivation of what they get a considerable response around interaction.

To answer question 3, it was necessary to know the growth data of the followers of both brands. The results show how these have grown over the past two years (see Figure 7).

Figure 7

Growth of followers on Ropa Gallardo and Afrikana's Instagram accounts



Note. Own ó (2024) from the data obtained in Fanpage Karma.

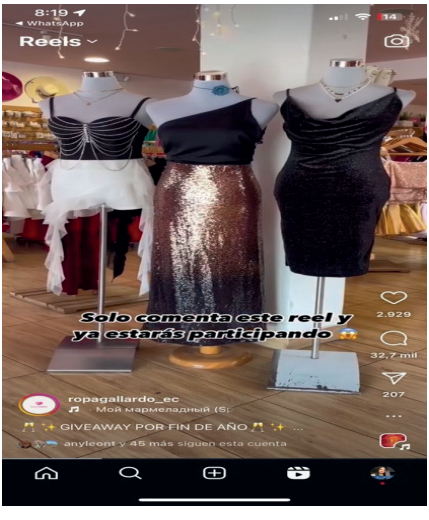
Between January 2023 and December 2024, Afrikana and Ropa Gallardo showed different growth trends in their Instagram followers. Afrikana, with a 67.6% increase in its fan base, shows significantly higher growth in relative terms, rising from 53,724 to 90,036 followers, reflecting effective strategies to capture new audiences in a probably more niche market. In contrast, Ropa Gallardo, despite its much larger initial base, experiences a more moderate growth of 5.6%, increasing from 447,015 to 472,053 followers, which could indicate a saturation in its audience or a focus on maintaining existing followers. The-

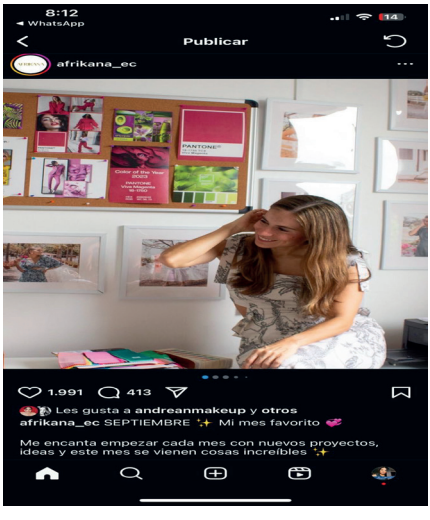
se differences highlight the importance of adapting strategies according to the stage of growth and the characteristics of the target audience of each brand.

To know the content generated by users, it was necessary to manually access Instagram accounts, taking into account that Fanpage Karma for privacy reasons does not access this type of information. Through a qualitative analysis sheet, it was verified in how many publications the Ropa Gallardo and Afrikana accounts were mentioned. The results show that in the first case there are 43 contents published with a label; while in the second case there are 26. In both accounts, the publications belong to collaborations of various types: photographic studios, influencers, brand collaborators, brand owners and in a smaller proportion followers who do not belong to other groups.

The same tool (observation tab) this time with the help of Fanpage Karma was used to know the number of comments of the publications. Both accounts have results far apart from each other, but with a high level of interaction considering the number of followers of each. Figure 8 below shows the two publications that have attained the highest number of comments during the study period.

Figure 8
Publications with the highest number of comments on Gallardo and Afrikana Clothing





As seen in the screenshots, the first post by Ropa Gallardo is a year-end competition, while the second, by Afrikana, is a post in which the CEO of the company shares a personal aspect of her work. Although they represent very different types of content, both publications manage to generate a high number of comments in proportion to the number of followers of each brand. This suggests that regardless of the nature of the content, both participatory dynamics, such as contests, and personal stories can capture the audience's attention and foster interaction. This phenomenon highlights the importance of understanding followers' preferences and using diversified strategies to maximize engagement.

To learn more about the comments generated by the Instagram accounts selected for this study, the top 200 brand posts were selected during the study period. The results revealed that between January 2023 and December 2024, while Ropa Gallardo records an average of 1084 comments per post, Afrikana reaches a much lower average of 40 comments per post, reflecting a noticeable difference in the ability of each brand to generate engagement.

Conclusions and discussion

This study has analyzed and contrasted the use of Instagram as a digital tool for the positioning of Ecuadorian fashion brands Ropa Gallardo and Afrikana, responding to the research questions raised. The comparison between these brands shows how differentiated strategies influence the perception and engagement of their audiences.

As for communication strategies, the contrast between the two brands shows the importance of adapting to the characteristics of their audiences. While Ropa Gallardo employs a high frequency approach in its publications, consolidating its constant presence, Afrikana opts for more curated content that appeals to quality over quantity. This suggests that there is no single strategy and that success depends on how these tactics align with the expectations of their followers. Afrikana, on the other hand, demonstrates a more refined use of its visual narrative, using personal stories and aspirational content to connect emotionally with its audience. This reinforces the idea that strategies based on storytelling and brand humanization are key to fostering meaningful engagement, especially in more niche communities.

Engagement analysis reveals that interactions depend not only on format or frequency, but also on context and emotional content. Afrikana stands out for its ability to maximize interactions in proportion to its fan base, demons-

trating that a focused and creative strategy can overcome the limitations of a smaller reach. In contrast, Ropa Gallardo, despite its greater volume of publications, could optimize the use of formats such as Reels or collaborations to capture new audiences.

It should be noted that collaborations play a crucial role in engagement. Afrikana leverages partnerships with niche influencers that resonate with its target audience, while Ropa Gallardo uses mentions and labels to reinforce its local brand identity. This contrast suggests that effective collaborations not only increase visibility, but also strengthen the perception of authenticity and relevance.

In terms of brand recognition, Afrikana is showing faster growth thanks to its ability to generate content that motivates participation and attracts new followers. This illustrates how strategies based on authenticity and cultural adaptation can be more effective in consolidating an emerging brand. For its part, Ropa Gallardo emphasizes the loyalty of its existing public, reinforcing its link with the local and cultural context. While this strategy ensures a stable base, it could limit its expansion potential into new markets. This finding highlights the importance of balancing strategies between audience retention and acquisition.

This research opens new possibilities to study digital marketing in the fashion sector. A key direction is to further analyze the impact of user-generated content (UGC) on the consolidation of digital communities and its influence on brand loyalty. Studies such as Kim and Lee (2017) highlight that the UGC fosters a sense of belonging and reinforces the perceived authenticity of brands, which could be replicated in emerging brands such as Afrikana. Also, exploring the effectiveness of transmedia narratives, which could offer new approaches to connecting with multidimensional audiences. As suggested in recent work (Jai *et al.,* 2022) transmedia stories can increase emotional engagement and consumer identification with the brand, crucial aspects to differentiate themselves in competitive markets. Finally, longitudinal investigations would be valuable to understand how changes in algorithms of platforms such as Instagram affect reach and engagement strategies. This would allow brands to anticipate trends and adapt their tactics to maximize their long-term impact.

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Use of the corporate media ecosystem to build trust under high-uncertainty conditions: a review of the energy sector in Chile, Colombia and Ecuador[1]

Utilización del ecosistema de medios corporativos para generar confianza en condiciones de alta incertidumbre: una revisión del sector energético en Chile, Colombia y Ecuador

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Abstract

During the COVID-19 pandemic, the corporate sector showed interest not only in ensuring business continuity but also in effectively communicating risks to shape behaviors and foster trust, despite the prevalence of "infoxication" among key stakeholders. This study examines the role of corporations as formal sources of information alongside traditional media outlets during a health crisis that, from a communication perspective, has been categorized as an infodemic within a rapidly evolving media ecosystem. Through semi-structured interviews and an in-depth analysis of sustainability reports from three energy companies in Chile, Colombia, and Ecuador, this research identifies the strategies, narratives, and communication tools employed to navigate the crisis. Findings indicate that, in their efforts to protect workers' health and enhance institutional reputation, these companies exhibited remarkable adaptability in leveraging various communication tools and channels to craft narratives that engendered trust among stakeholders. Despite high levels of uncertainty, the companies successfully structured an efficient media ecosystem to complement stakeholders' information consumption patterns. This perspective constitutes the study's primary contribution, as it highlights how, within the context of COVID-19, corporate discourse was strategically designed to build trust and encourage behavioral changes among employees and their families regarding preventive measures. In this regard, the corporate media ecosystem, through the deliberate construction of trust narratives, emerges as a fundamental component of stakeholders' communication frameworks and a crucial mechanism for counteracting misinformation, including "infoxication".

Keywords

Risk communication, media ecosystem, corporate discourse, strategic communications, COVID-19.

Resumen

Durante la pandemia de COVID-19, el sector corporativo mostró un interés significativo no solo en la continuidad del negocio, sino también en la necesidad de reforzar la confianza a través de la comunicación de riesgos de manera que permite modificar comportamientos a pesar de los altos niveles de "infoxificación" entre los principales interesados. Este estudio arroja luz sobre el papel asumido por las empresas como fuentes formales de noticias junto con los medios de comunicación tradicionales durante una emergencia sanitaria que, desde una perspectiva comunicacional, ha sido categorizada como una infodemia dentro de un ecosistema de medios emergentes. El estudio identificó estrategias, narrativas y herramientas empleadas por tres empresas energéticas en Chile, Colombia y Ecuador a través de entrevistas semiestructuradas y un análisis en profundidad de sus informes de sostenibilidad. Se encontró que, en sus esfuerzos por proteger la salud de los trabajadores y fortalecer las reputaciones institucionales, las empresas demostraron una alta adaptabilidad en su uso de herramientas y canales para construir narrativas que inspiraran confianza entre los interesados. A pesar de los altos niveles de incertidumbre, las empresas configuraron un ecosistema de medios eficiente para complementar la dieta comunicacional de los interesados. Esta perspectiva es la principal contribución de este estudio, dado que, en el contexto de COVID-19, el discurso corporativo estaba orientado a inspirar confianza y modificar comportamientos entre los trabajadores y sus familias respecto a las medidas preventivas. En este sentido, el ecosistema de medios corporativo, bajo la construcción de una narrativa de confianza, es un componente adicional de la dieta comunicacional de los interesados y un ingrediente vital para contrarrestar la desinformación.

Palabras clave

Comunicación de riesgos, ecosistema mediático, discurso corporativo, comunicación estratégica, COVID-19.

Introduction

The COVID-19 pandemic presented a huge challenge due to its profound impacts on health, in the social, economic and communication areas (ECLAC, 2022; Barrutia *et al.,* 2021; García-Madurga *et al.,* 2021; Miles *et al.,* 2020; WHO, 2020). In Latin America, the uncertainty showed the great inequalities and highlighted the fragility and structural weaknesses of state institutions. These vulnerabilities increased by cultural factors that hindered an effective and safe response to the crisis (Cárdenas Ruiz and Pineda Rodríguez, 2021). The media, traditionally responsible for guiding and educating the public, struggled to fulfill their role due to the large volume of digital content, which lacked adequate fact-checking. This scenario led to an overabundance of information, thus generating a serious threat to public health (Briceño-Romero *et al.,* 2023; Gonçalves *et al.,* 2022; Heydari *et al*., 2021; WHO, 2020; Valenti *et al*., 2022, Zarocostas, 2020).

According to the World Health Organization (WHO), an epidemic occurs when excessive inflows of information – partly false or misleading – arise during an outbreak of disease. This phenomenon fosters uncertainty, erodes trust in health authorities and encourages behavior that endangers public health (WHO, 2018). Faced with these risks, it is necessary to examine how corporations informed their employees through various communication channels to protect public health while ensuring the uninterrupted supply of energy, which is an essential service for communities.

This study aligns with Beck's Risk Society (2007) framework, which states that while risk has been an inherent aspect of human existence since the dawn of civilization, contemporary society is uniquely defined by the omnipresence of risk that knows no borders (Beck, 2007; García and Goycolea, 2021; Zunino, 2021; UNDRR, 2017, cited by Liberona Durán *et al.,* 2021).

This study, which was conducted between May 2021 and May 2022, employs an integrated approach that links the directives of the WHO and the Pan American Health Organization (PAHO) with the corporate communication strategies implemented by companies to implement risk communication measures through their corporate media ecosystems. These efforts complemented the consumption of information from employees and their families regarding virus containment measures, including the use of masks, social distancing, and hand hygiene. In this context, this research highlights the role of corporations as formal sources of information, complementing traditional media

during a health crisis that, from a communicative perspective, has been classified as an infodemic within an emerging media ecosystem.

Study approach and research questions

Electricity demand can serve as an indicator of the socioeconomic impact of a pandemic within a country, as it reflects reductions in levels of industrial consumption (Sánchez Úbeda *et al.,* 2021). As an essential service, the energy sector deserves careful analysis because of the challenges associated with maintaining system operations amid high uncertainty, fluctuating consumption patterns, and economic disruptions. In this framework, this study aims to analyze the risk communication strategies implemented by energy companies in Chile, Colombia and Ecuador during the COVID-19 pandemic. To this end, the following research questions were asked:

- What risk communication strategies were deployed by the energy companies examined during the Covid-19 pandemic?
- What are the characteristics of the narrative language used by these companies during the Covid-19 pandemic?
- What channels or tools were used to communicate risks to recipients during the pandemic?

Risk is inherent in the day-to-day operations of companies and can manifest itself in various ways, many of which cannot be eliminated (Rodríguez López *et al.,* 2013). The analysis of risk management in an organizational context would be incomplete without examining how risk is communicated. This perspective is the main contribution of the study, as corporate discourse during the COVID-19 crisis was strategically designed to instill trust and influence behavior change among workers and their families in relation to preventive measures. In this regard, the corporate media ecosystem emerges, by building a trust-based narrative, as a key component of stakeholder communication frameworks and a mechanism to counter disinformation, including info-toxication.

Risk Communication

Risk communication, in its theoretical and practical evolution, has been shaped by various theories, models and approaches of disciplines such as

sociology, psychology, economics and social education, among others (Gómez Castro, 2017). It is an emerging and interdisciplinary field of research and practice (Balog-Way *et al*., 2020; Glik, 2007) that has been developed in response to the need for specialized information oriented to prevention during crises, disasters and public health emergencies (Farré Coma, 2005; Berg *et al.,* 2021). From this perspective, risk communication can be analyzed across multiple disciplines, including disaster management, environmental risk communication, crisis communication, and health communication and promotion. This study incorporates key elements of media communication (information to the public), crisis management (proactive action before and after crises) and communication and health promotion (preventive measures).

The World Health Organization (WHO) defines risk communication as the exchange of information and guidance among experts on situations classified as high-risk, making it a critical component of emergency response efforts (Risk Communication, 2023). When implemented effectively, risk communication facilitates the use of appropriate measures in crisis situations, such as natural disasters and disease outbreaks, while increasing confidence in official guidelines issued by authorities. Therefore, its main objectives include the modification of risk mitigation behaviors (Cárdenas Ruiz and Pineda Rodríguez, 2021; Fischhoff, 2020) and the configuration of risk perception and assessment (Covello and Sandman, 2001; Sandman, 2003; Slovic and Peters, 2006; Stajnolovic, 2015), which ultimately helps prevent threats (Porat *et al*., 2020; Prior, 2020; Zhang *et al*., 2020).

According to Gallardo-Paúl (2021), pandemics pose a unique risk communication challenge, as the dissemination of information reaches a wide public that includes people who may not be perceived as at risk. Moreover, public alarm can sometimes be as contagious as the disease itself, leading to disruptions that hinder the effectiveness and clarity of communication efforts.

A review of the specialized literature indicates that research on risk communication has expanded significantly in recent decades (Goerlandt *et al.,* 2020; Berg *et al.,* 2021; Ortiz Núñez and Stable Rodríguez, 2021; Betsch, 2020). This growing volume of work, along with contributions from traditional media (e.g. Mauri-Ríos *et al.,* 2020; Lázaro-Rodríguez, and Herrera-Viedma, 2020) and different social media platforms (Cárdenas Ruiz and Pineda Rodríguez, 2021; Chen *et al.,* 2024; Márquez Domínguez *et al*., 2021; Sutton and Veil, 2017), highlights the complexity of risk communication between government institutions, health organizations, the media and the general pu-

blic. In an evolving and ethically demanding media ecosystem, the effective dissemination of risk-related information remains being a key challenge.

Risk communication strategies

The development of risk communication strategies is defined as "the platform from which activities are defined, planned and prepared for each stage of an emergency that impacts public health" (PAHO, 2011, p.1). A well-structured risk communication strategy is needed to minimize the impact on health at any stage of an emergency or disaster. According to Porat *et al.* (2020), communication strategies should be adapted to cultural norms, values and contextual factors. As a result, a culture of medical autonomy that is effective in a country may require external regulation or legislation.

The risk communication model developed by the Pan American Health Organization (PAHO) under the International Health Regulations (IHR) comprises five phases: preparedness, initiation of the public health event, control, recovery and evaluation.

The first stage of preparation is to establish a basis for building trust between the public and the authorities. Key actions include the creation of a risk and crisis communication team, internal and interagency coordination, the development of a crisis communication plan, internal and external training for various audiences, the creation of messages and dissemination formats for preparedness, response and recovery, communication monitoring and management of media plans and resources.

The second phase begins at the beginning of the event or crisis, during which an operations, emergency or crisis committee is activated (Fink, 1986; Saura, 2005; Sánchez-Calero, 2012; Verazzi *et al*., 2021). This unity is essential to manage both an internal and an external crisis. One of the main responsibilities of a crisis committee is to select spokespeople who can communicate not only clearly and transparently, but also with empathy, compassion and solidarity. In addition, they must be experts in non-verbal communication (Gutiérrez Blanco, 2011; PAHO, 2011). During this phase, simple, credible, verifiable, consistent and timely information needs to be provided (Calleja-Reina *et al*., 2018; Ortiz Núñez and Stable Rodríguez, 2021) through reliable sources, due to the high demand for information (Généreux *et al.,* 2021) in a climate of uncertainty, fear and skepticism during a health emergency. In this context, public trust in government officials is a determining factor for

effective risk communication (Böl, 2016; Gallardo-Paúls, 2021). As Gómez Castro (2017) states, "Trust guarantees the credibility of the messages disseminated by the national authorities" (p. 3390). Transparency is also essential, ensuring the delivery of complete, timely and accurate information on the actual and potential risks associated with the outbreak and its containment (WHO, 2008). During the control phase, the target population becomes more receptive, providing an opportunity to correct rumors and misinformation. At this stage, the main objective of risk communication is to help stakeholders better understand their personal risk levels, enabling them to make informed and timely decisions. Effective risk communication depends on both credible sources and an open and honest dialog. As Moreno and Peres (2020) emphasize, "experts must be active participants in this process, as they convey a sense of calm to the population" (Moreno and Peres, 2020, p.8).

The recovery phase requires the continuous dissemination of accurate messages to stakeholders, particularly vulnerable populations, to encourage adherence to health recommendations. This phase also assesses responses to risk communication activities, and identifies and addresses gaps to improve future crisis management. Finally, during the evaluation phase, the effectiveness of each strategic component is assessed, providing guidance for future crisis situations (Coombs, 2008).

Throughout all the phases previously discussed, it is necessary to consider the dimensions of the discourse, especially the characteristics of the senders and receivers (psychological approach) and the medium or channel used (communicative approach), when developing and implementing a communication strategy. Nespereira (2022) states that "it is necessary to adopt an approach that considers the process of social construction of the concept of risk, the importance of language, arguments or the different narratives that shape this process" (p. 65). In addition, the author identifies three key elements in health crises that contribute significantly to this social construction: the precautionary principle, the principle of authority and the coexistence of multiple narratives that converge to explain the same phenomenon.

The language used to describe a health crisis plays a crucial role in shaping public perceptions, particularly through conceptual metaphors (Ibarretxe-Antuñamo, 2012; Villa, 2018). These metaphors often frame an epidemic as an invasion or attack (Rocamora *et al*., 2022) and epidemiological control policies as a war (Nespereira, 2014; 2022). According to Rojas et al. (2020), the COVID-19 crisis led to the widespread use of war metaphors, including

the state of war, the ruthless enemy and health heroes in government and media discourse, reinforcing narratives and militarized values (Cuenca, 2020; Lovón Cueva *et al*., 2021). However, Rojas *et al*. (2020) warn that "This military logic has set aside the fundamental values in health care associated with the duty of care and collective action" (p. 710). Similarly, Sabucedo *et al.* (2020) argue that war metaphors disrupt social behavior, undermine democratic processes, and reduce empathy and mutual care. Given these concerns, a narrative that fosters clarity and trust and mitigates uncertainty during a health emergency must be constructed.

Communication channels

Any communication strategy should define the channels used to disseminate information, as they serve to convey messages with specific objectives (Heydari *et al.,* 2021; WHO, 2017; Valenti *et al.,* 2021; Zunino, 2021). Therefore, the selection of communication channels is a fundamental component of strategic planning, since it guarantees an effective commitment with the target interest groups (Gutiérrez Blanco, 2011; Moreno and Peres, 2011; Karbaum-Padilla, 2022).

The public is informed about health risks through a wide range of channels and sources of communication. This information consists not only of newspapers, television, print media, government websites, scientific journals, radio and official government messages, but also of interpersonal and informal sources, including friends, family, health professionals and social media (Lin *et al,* 2014; Gesser-Edelsburg *et al.,* 2020; Suau-Gomilla *et al.,* 2017). Therefore, people are not merely passive recipients of health risk information, but actively interpret and respond to information-based messages from multiple communication channels, sources and health authorities (Berg *et al.,* 2021).

Organizations have become primary sources of information, ensuring that their employees are informed and are able to perform their duties. As a result, internal crisis communication strategies are activated and adjusted as needed. This requires secure and efficient internal communication channels and good physical and wireless networks that provide secure, stable and fast responses (Xifra, 2020, p. 7).

Managing risk communication within an organization involves a number of variables. However, strategies should remain adaptable, as they should be

reviewed in response to changing circumstances. This requires continual adjustments to messages, channels, narratives, and tactics, among other factors.

Methodology

This qualitative, descriptive study followed a phenomenological design, incorporating interviews and documentary analysis. The study sample has been taken from organizations included in a larger study on large companies in Latin America (Colombia, Ecuador and Chile) with well-documented practices in strategic communication and sustainability (Durán *et al.,* 2021). Three energy companies were selected from this group, one from each country, based on the following criteria: (1) they must publish a 2021 sustainability report in a downloadable format that meets Global Reporting Initiative (GRI) standards, and (2) agree to participate in an in-depth interview with their communications managers. In addition, the selection was carried out on the idea that the socioeconomic conditions of each country correlate with fluctuations in electricity demand; that both the public and stakeholders expect greater transparency regarding sustainability activities; and that large energy companies have greater resources to plan and implement risk communication strategies (Sánchez Úbeda *et al.,* 2021; Cota, 2023).

The sustainability reports of each company were analyzed using content analysis techniques. For the interviews, the authors developed a questionnaire based on the Convergence Model for Communication and Sustainability of Durán and Mosquera (2016), which identifies best practices in strategic communication and sustainability, especially in risk and crisis contexts such as the COVID-19 pandemic. In addition to exploring sustainability perspectives and efforts to plan and allocate community resources, the interview questions focused on describing the company's practices related to communication goals, strategies, and information flow.

Each interview lasted approximately 45 minutes and was conducted in Spanish via Zoom between May 2021 and February 2022. Interviews were manually transcribed, and data processed using NVivo software in the following analytical categories: risk communication strategies and plans, constructed narratives, and communication tools used during the pandemic.

Results

The information obtained from the interviews, crossed with the content analysis of the sustainability reports, was classified and analyzed according to three categories: risk communication strategies and plans, constructed narratives and communication tools used during the pandemic.

Risk communication strategies

In interviews with communication professionals from electrical companies in Ecuador, Colombia and Chile, one of the first reflections was the decision to maintain continuity in existing communication strategies with various actors. One interviewee underscored the critical role of risk communication: "I would say that plans are useful, but of course, they had to be adjusted because a plan is one thing and real life is another... but they were useful because we were able to keep them." (Coordinator, Corporate Relations, Isagen).

Regarding the continuity of risk communication plans, the representatives of Colbún (Chile) acknowledged that although multiple scenarios had been considered, the magnitude of the COVID-19 crisis had been unforeseen: "When you work in a company, you have a risk map... I don't think this was on any risk map in any company; these things involve great learning" (Communications Manager, Colbún). At CELEC in Ecuador, these strategies laid the groundwork for future planning:

> We have always worked on emergency and contingency plans, and they were useful as a starting point for creating health protocols along with health personnel, occupational safety personnel, brigades and subcontractors, among others, who were part of the contingency plan implemented. (Communications Director, CELEC)

Companies had well-structured plans that allowed them to ensure business continuity, sustain policies, and sustain strategic initiatives. Another key aspect was the commitment of companies to strengthen their corporate image and foster trust. As they navigated the health emergency, communication professionals also prioritized maintaining public trust in their institutions:

> For us, the main goal was to maintain trust with stakeholder groups. This is our overarching goal, as it was not introduced solely because of the pande-

> mic; rather, the goal has always been to ensure continued trust, especially in times of uncertainty. (Coordinator, Corporate Relations, Isagen)
>
> The goal of these activities was to inform before rumors spread, to give accurate and detailed information and to convey confidence and security to strengthen our corporate image. (Communications Director, CELEC)

Maintaining trust in the organization was not only a matter of corporate image and reputation; risk communication plans and strategies also required complementary elements, such as feedback mechanisms and communication approaches tailored to different stakeholders, including employees.

The strategies implemented were designed to protect the image of the company, while preserving relationships with stakeholders and ensuring transparent and continuous communication. In a framework of trust, these measures were aimed at safeguarding the health and safety of workers and their families.

Risk Communication Narratives

Isagen's narrative strategies had a simpler and less schematic communication.

> It is about moving away from technical language and considering what the other person expects, feels or perceives because, from a technical point of view, it may be one thing, but their concerns may lie elsewhere (Coordinator, Corporate Relations, Isagen)

From this perspective, it was necessary to adopt a communication approach that moved away from technical language and took into account the cognitive abilities of the various stakeholders. "A brief, clear and concise document that details exactly the steps to follow in an unexpected situation" (Director of Communications, CELEC).

In this context, protocol sharing served two key purposes: raising awareness of standards and maintaining trust among stakeholders, particularly employees. "With this idea of maintaining trust with key interest groups, we set out to explain the protocols to them … because if there is trust and spaces for dialogue, then there are solutions" (coordinator, Corporate Relations, Isagen). Similarly, the Isagen Sustainability Report highlighted the importance of communication and operational continuity: "We maintained our level

of communication and interaction without compromising the health of our customers or our team, and managed customer emergencies 24 hours a day, 365 days a year" (Sustainability Report, Isagen, p. 11).

A defining aspect of companies' narrative strategies was their dual purpose: adherence to pandemic-prevention protocols and strengthening firms' trust and reputation among key stakeholders. CELEC's Communications Director in Ecuador emphasized this approach:

> The reference speech at CELEC, both before and after the pandemic, focused on positioning the company as an institution that ensures trust and continuity in the generation and transmission of energy, as well as the development of new business projects and initiatives of corporate social responsibility and environmental policy. The goal of these efforts was to inform before rumors could spread, ensuring greater accuracy and detail while fostering trust and security to strengthen the company's corporate image.

Finally, the companies' reports state that health and safety measures are equally essential to ensure the uninterrupted supply of energy, which is an indispensable service. Companies also underscore their commitment to maintaining power generation and transmission, even amid the health crisis and operational challenges posed by the pandemic.

Risk communication channels and tools

For the energy companies studied, the communication channels and tools used as part of their risk management strategies became as critical as their strategic and narrative actions. They focused their efforts on adapting existing media and channels, temporarily assuming the role of content creators and producing quality information compared to that of mainstream media in their respective countries.

Companies also adapted their communication channels to incorporate the technological advances needed at the time, supported by information and communication technologies (ICT). In Colbún's case, they kept their radio segments on social media, reusing them as podcasts to reach wider audiences. "We conduct communication campaigns and webinars to keep workers informed of new recommendations and instructions" (Sustainability Report, Colbún, p. 106).

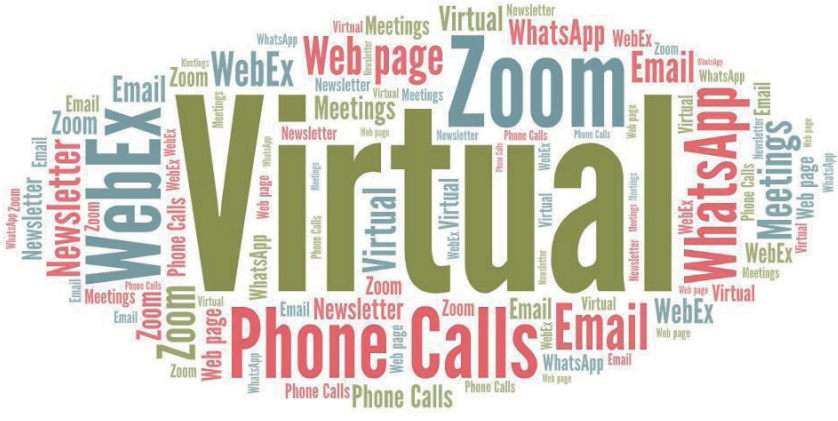
The transition from risk communication to crisis communication required two key adaptations: the shift to virtual platforms and more frequent engagement with stakeholders. Face-to-face meetings were replaced by virtual meetings through platforms such as Webex, Zoom and Teams. In particular, the three companies showed a great deal of adaptation to the new circumstances. They not only optimized their existing channels, but also created new communication platforms. In the case of Colbún in Chile, one of its most significant innovations was the launch of a new medium:

> We develop radio programs on local stations in all the communities where we operate. These broadcasts were used to deliver prevention messages and featured specialists sharing best practices with the public, covering topics ranging from basic health information to mental well-being. (Communications Manager, Columbus)

This conclusion is essential as it illustrates how these companies evolved into content creators and, in some cases, media, driven by their commitment to protecting employees and key stakeholders. These actions were essential to build public trust, as companies provided a critical service to the community. This media transformation was reinforced by the need to leverage several virtual platforms (see Figure 1).

Figure 1

Communication Channels and Tools



There were several tools and channels used by companies, and they were managed in a virtual framework adapted to the needs of their various stakeholders. At CELEC in Ecuador, each tool served a different purpose:

> Phone and virtual interviews with media to share company actions... planned social media activations, including memes and tweets; planned social media activations, including memes and tweets... communication materials for social media and WhatsApp to promote corporate initiatives... the creation of engaging graphic content and videos to inform audiences... the launch of a new radio station... and information bulletins to keep the media informed and prevent the spread of false information. (Communications Director, CELEC)

This range of communication tools allowed companies to reach a wider audience and deliver a higher volume of messages. In particular, WhatsApp emerged as a key communication channel, despite not being part of the companies' pre-established communication strategies to maintain close contact with stakeholders, especially employees: "We confirmed that WhatsApp was an effective medium … distribution groups were created to send messages quickly and directly to internal audiences and communities within our areas of influence" (Director of Communications, CELEC).

> WhatsApp entered the scene... although it was the least corporate channel, it proved to be useful at certain times. Although informally, each department had a group, including management. We used WhatsApp as a lifeline, particularly at the beginning of the pandemic, and it was very effective in maintaining communication with workers and communities. (Coordinator, Corporate Relations, Isagen)

Although WhatsApp had not previously been incorporated into companies' risk communication plans, it became an essential channel during the pandemic, demonstrating its adaptability and effectiveness in crisis communication.

Discussion and conclusions

During the pandemic, strategic communication in companies in Latin America faced several challenges due to the social, political and economic

complexities of the region (Álvarez-Nobell *et al.,* 2022). Within the media ecosystem, public risk perception should be understood not only to strengthen risk communication strategies but also to support and complement public health efforts during endemic, epidemic or pandemic scenarios. In addition, multiple entities involved at various levels within a company should be considered, beyond direct employees, including subcontractors, suppliers and their families.

As for the first research question on risk communication strategies deployed during the pandemic, the results indicate that risk communication plans designed for hypothetical scenarios often require significant adaptation in response to unprecedented crises such as a pandemic. Business continuity became a priority of the companies' communication strategies. Although companies had risk management plans in place, most strategic risk efforts were quickly shifted to crisis management through the activation of crisis committees or emergency operations committees, recognizing that suspension of operations was not an option.

Despite the different political, cultural, economic and social conditions in the three countries studied, similarities were observed in the types of media used, the stakeholders concerned, and the narrative strategies used. Businesses successfully translated pre-defined strategic plans into concrete crisis management actions.

The second research question examined the narrative language used by energy companies to address emerging challenges. Common guidelines included a preference for clear, non-technical communication, a greater emphasis on dialog with stakeholders, and a focus on prevention messages. In particular, corporate narratives served a dual purpose: while the company's leaders adhered to pandemic-prevention protocols, they also worked to improve their corporate image and strengthen trust among key stakeholders.

As companies adapted their risk communication plans and developed narratives, their main concerns focused on ensuring the continuity of an essential service (electricity), safeguarding employee health, and strengthening corporate reputation. These goals were achieved through continuous dialogue and collaboration with reliable sources, such as health professionals, to obtain reliable data on health and prevention and to build trust among stakeholders. Due to the growing volume of information and disinformation during the epidemic, companies strategically positioned them-

selves as trusted voices alongside traditional media through the use of specific tools and narratives.

The third research question sought to identify the channels and tools that electrical companies used to reach their audiences during the pandemic. The three companies leveraged traditional media and adapted their approaches based on changing circumstances, necessary narratives, and corporate objectives. One significant finding was that corporate communication departments not only acted as intermediaries, but also assumed the role of content creators, effectively functioning as media outlets. This was seen in their collaborations with traditional media to develop radio programs, visual materials and other content designed not only to inform but also to combat disinformation during the epidemic. In this sense, corporate communication channels became main components of the media ecosystem and the stakeholder information landscape.

Although none of the companies had previously considered WhatsApp a viable communication channel due to its primarily personal use, they quickly recognized its potential as an effective tool to build trust and enable instant, two-way communication with stakeholders. These findings suggest that the choice of communication channel is less critical than the way it is used. The effectiveness of a given media depends on the application of well-designed strategies and descriptions tailored to the specific context.

The experiences of communications managers reinforce the notion that risk communication is needed in any organization and that adaptability is key to its success. Therefore, companies must continually evaluate their strategic communication efforts, refining their processes to transform risk communication plans into structured guidelines that describe best practices for crisis management. But it is equally important to recognize that each crisis is unique and requires a tailored approach.

Finally, governments, public institutions, the media, and businesses must strengthen collaboration by using accurate language and credible sources to effectively influence stakeholder behavior during health emergencies and other disasters in which prevention is critical to risk mitigation.

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Note

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Declaration of Authorship - Taxonomy CRediT	
Authors	**Contributions**
Jaime Alberto Orozco-Toro	Conceptualization, data curation and formal analysis.
Lorena Retamal-Ferrada	Validation, visualization and writing - original.
Melita Vega	Research and translation.
Caroline Avila	Acquisition of funding, methodology, review and editing.

Convocatoria del Dossier
Sensibilidades y experiencias urbanas: Producción social de sentidos y emociones en las ciudades contemporáneas

N°42 (marzo-agosto 2025)

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Fecha límite de entrega de artículos: CERRADO

Los centros urbanos enfrentan actualmente procesos de transformación de cara a los cambios ambientales, energéticos, tecnológicos, políticos, económicos, laborales, migratorios, por mencionar solo algunos, que se suceden tanto en el Norte como en el Sur Global. Dichas transformaciones suponen la profundización de procesos de desigualdad y segregación socioespacial y racializante que, encarnados en cuerpos atravesados por la interseccionalidad de género, raza/etnia, clase, generación y contexto geocultural, imponen particulares modos de vivir, sentir y habitar las ciudades que deben ser explorados en forma crítica por las Ciencias Sociales.

En tanto ámbitos privilegiados para la producción de cuerpos, interacciones y mercancías en el marco del capitalismo, las ciudades son también centros estratégicos para la reproducción y circulación de experiencias sensoriales y afectivas. Las prácticas de oler, ver, escuchar, tocar, gustar, junto con otras formas de sensorialidad, están relacionadas con los entornos cotidianos en los que los sujetos viven y conviven. Así, analizar lo urbano desde la mirada de las sensibilidades implica abordar tanto las experiencias emocionales y sensoriales como las prácticas cotidianas y regulaciones sociales que las componen a nivel individual y colectivo, en conexión con los procesos de estructuración y cambio social. Asimismo, estudiar el habitar en las ciudades contemporáneas supone observar la configuración de los espacios y las comunidades emocionales y sensoriales que las conforman, en clave de sus conflictos, prácticas, demandas, disfrutes e interacciones.

Este Dossier temático convoca al intercambio académico a través de la presentación de propuestas que presenten resultados de investigaciones em-

píricas, así como reflexiones teórico-metodológicas que confluyan en el estudio de los sentidos, experiencias y sensibilidades urbanas. El objetivo es establecer diálogos entre distintas perspectivas teóricas y miradas analíticas que posibiliten abordar en forma crítica las transformaciones sociales arriba señaladas, así como brindar un espacio para la reflexión y la construcción de conocimientos sobre los desafíos que imponen las ciudades hoy.

Todas las propuestas deberán tener como eje analítico el estudio de los sentidos, experiencias y sensibilidades que se producen y reproducen en las ciudades contemporáneas. Algunas líneas temáticas sugeridas son:

- Acción colectiva, conflictos urbanos y comunidades emocionales y sensoriales.
- Espacio urbano, sensibilidades y noche.
- Habitabilidad, sensibilidades y políticas de los sentidos.
- Desigualdades, sociabilidades y dinámicas de estructuración social en la ciudad.
- Migración, pobreza y procesos de segregación socioespacial y racializantes en las ciudades del siglo XXI.
- Ciudad, emociones e interseccionalidades.
- Espacios digitales y experiencias urbanas.
- Palabras clave: sensibilidades; ciudad; políticas de los sentidos; emociones; espacio; estructuración social.