

Article

Public Bike Sharing Programs Under the Prism of Urban Planning Officials: The Case of Santiago de Chile

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Abstract: Background: Public bike-sharing schemes have gained enormous popularity worldwide. However, so far most of the research has focused on issues regarding the functioning of these schemes in cities, with little attention on how these systems are perceived and managed by urban planning authorities, which is the aim of this paper. Methods: The analysis is set in Santiago, a highly segregated city composed of 37 independent districts. Two focus groups with urban planning authorities belonging to districts with and without functioning bike-sharing schemes were conducted. Information was processed using a thematic analysis framework, which permitted to reduce, reorganize, and analyze these testimonial data. Results: The main results show that bike-sharing schemes are perceived as being part of a larger phenomenon related to the city's socio-economic differences. A series of issues emerged that are related to urban planning authorities limitations in terms of governance and availability of planning instruments and strategies to cope with contrasting realities of the city. It was noted that bike-sharing schemes are helping to improve a neighborhood image, while, at the same time, promoting contemporary and cosmopolitan lifestyles. However, the functioning of bike-sharing schemes also is a reminder of the fragmented and dysfunctional governance of Santiago.

Keywords: bike-sharing; urban planning officials; bicycling infrastructure; Santiago

1. Introduction

Public bike-sharing programs (PBSP) have achieved widespread popularity in the last 15 years with currently more than 1 million bicycles in roughly 900 cities in operation [1]. Such are often promoted as sustainable transportation alternatives, for either recreational or utilitarian trips [2]. Different bike-sharing schemes exist, ranging from those in which users pick up and return public bikes at docking stations installed in the city (dock-based systems), or those of which pick up and return processes are permitted in any place (dock-less systems).

Likewise, a series of benefits has also been related to the implementation of bike-sharing programs. For instance, insights on the subject in recent literature have shown how these systems could help cities to reduce congestion periods [3,4], increase physical activity, along with positive health and wellbeing perceptions [5–8], moreover promoting and enhancing the use of more bicycles, seeking to attract more users to this mode of transport [9]. Considering their economic impacts [10], and a reduction of global emissions [11], they help to generate social values and communitarian cohesion [12].

The functioning of PBSP involves various stakeholders, including city-level urban planning officials, local authorities, regular users, and pedestrians, among others. These stakeholders interact

with each other on a daily basis, either formally or informally, defining the actions that make possible the functioning of PBSP. Until now, most research on bike-sharing developments have focused on the functioning of systems themselves (e.g., the characteristics of highly demanded stations and the management of fleets), or the perception of users (e.g., the perceived benefits of these systems or the barriers that make them unattractive), with little attention to those who are related to the planning and operation of these systems at a local level: Urban planning officials (UPOs).

The Chilean urban law specifies that both development plans (Planes de Desarrollo Comunal) and land use plans (Planes Reguladores Comunales in Spanish) of prepared local governments had to be monitored by urban planning officials (asesores urbanos). They also have to coordinate investment defined by the different ministries and agencies, and to advice Mayjors regarding urban all investment. UPOs are inherently driven to experience, on a daily basis, the dynamics of the city, and, therefore, are a valuable source of information in the understanding of the functioning of PBSP. Whether related to planning of bike-sharing stations, or their related infrastructural challenges, urban planners may provide a key source of information to understanding the success or failures of PBSP.

Santiago's recent experience with the implementation of PBSP is a contingent case that deserves attention with regard to the latter respects. Moreover, it is also a case that could bring attention to how relatively new bike-sharing programs are generating changes in the local mobility and accessibility patterns of Latin American cities. Considering that in the case of Santiago—as well as in other Latin American cities—PBSP have been implemented on the go within the last decade, most UPOs may still be adapting to these new systems of transport and their roles in the city in terms of enhancing new forms of mobility, accessibility, urban vitality, urban image, and prestige, among other dimensions.

Accordingly, our main research question is focused on analyzing local planning authorities' experiences with regard to public bike-sharing schemes (else PBSP) and, more specifically, depicting how different challenges, needs, stakeholders, and agency factors are being addressed by these professionals—how are local planning authorities perceiving and managing the different challenges and needs of the different stakeholders involved in bike-sharing schemes in Santiago?

This research question aims to depict matters of *what* and *how* different elements of discourse and planning practice processes are inherent to (1) the understanding of the recent PBSP implementation phenomenon and (2) their expectations in terms of present and future planning practice adaptations.

This article is structured as follows: Section 2 will briefly present a literature review on the qualitative perception of bike-sharing schemes by different stakeholders, followed by Section 3, which brings attention to the particularities of the Santiago case. Section 4 on methodology will cover details for resolving our main research question, with the use of focus groups for data building and thematic analysis for exploring our empirical evidence. Section 5 will show the results obtained by our research, while Section 6 will close up with a discussion on possible avenues of research considering such results, later outlining conclusions.

2. Literature Review

Despite their relative novelty, bike-sharing schemes have been profusely studied in the last 10 years, with more than 100 studies published in the last five years. So far, studies on bike-sharing schemes can be divided into three main groups. One group has attempted to deal with massive trip data coming from online platforms in order to assess and ultimately predict either the characteristics of the urban environment in shaping demand [13–15], the aggregate spatial patterns of bike-sharing users [16,17], or the mechanisms to optimize bike supply or bike collection [18,19] of dock-based or dock-less bike-sharing schemes [20].

Another group of research has attempted to assess the implications of bike-sharing systems on health, transport, and other dimensions of public life. In relation to health, a comprehensive study of 12 bike-sharing schemes showed that the physical activity produced by PBSP, which helps prevent about five premature deaths, outweighed the risks of road fatalities and air pollution exposure [21]. Similar results have been found in the case of the UK [6].

In relation to transport, studies of PBSP have focused mainly on their implications of congestion and interaction with other modes. For example, there is evidence that PBSP help reduce congestion: A study in Washington DC showed a 4% decline in traffic congestion as a result of the functioning of a PBSP [4]. Various reasons might explain this phenomenon. On the one hand, PBSP help to diminish the use of cars [5], although the extent of this change depends on the existing proportion of car trips in cities [22]. Interaction with modes other than cars, on the other hand, are diverse. It is often the case that bike-sharing stations are in close proximity to other modes of transport, such as subway stations or bus stops, creating synergies with other modes of transport that enhance both modes [22]. Evidence shows that subway stations with high numbers of passengers are also those with larger number of bike-sharing trips [23]. However, the opposite might also occur, as PBSP can substitute trips made in public transport. In fact, a study in New York City showed that installing bike-sharing docks close to bus routes brought a slight decrease in the number of bus trips in these routes [24]. The reason behind the latter is that PBSP encourage short trips [14,25] and are, therefore, an efficient alternative for dense urban environments.

A third group of studies has attempted to characterize users and non-users of bike-sharing systems in terms of their socio-economic status, gender [26], mobility patterns, and motivations [27,28]. In a related line, some research has investigated the barriers and facilitators (financial, attitudinal, or influenced by the built environment) associated with the use and acceptance of these schemes in users. For example, Fishman, Washington, and Haworth [29], reported that technological procedures acted as barriers for bike-sharing users, while Guo et al. [26] showed that satisfaction with PBSP is related to income, location (users closer to a bike-sharing station were more satisfied than those away from it), and subjective perception. Those who perceived the system more positively were more satisfied with it. Moreover, in their study on university bike-sharing cyclists in China, Chevalier and colleagues [30] found that convenience and health were the two concepts more strongly associated with cycling, while Nikitas [31] showed that inadequate cycling infrastructure was a major deterrent to the acceptance bike-sharing schemes. The vast majority of those studies, however, fail to address the relation between these results and urban planning procedures at a local or city-level.

Most of these results have been obtained through surveys reflecting the quantitative data-driven bias that has shaped bike-sharing research to date. This should be a matter of concern, for subjective information on how mobility systems are perceived could be used by planning professionals who might play a major role in permitting to make these systems more appealing to the users. In addition, understanding personal opinions on the operation of PBSP might help to explain and to make sense of aggregate results obtained by surveys. An exception to this rule is the work of Fishman et al. [22], in which different types of cyclists as well as users of bike-sharing schemes were interviewed to collect their motivations for using these systems. According to these authors, perceived barriers to the enrolment of bike-sharing schemes involved bureaucratic processes, regulatory norms (e.g., mandatory use of helmets), the scarcity of docking stations in peripheral residential areas, and the complexity of information regarding the use of shared bikes at docking stations. In addition to these trends, Fishman et al. [29] found that cycling facilities play a major role in enabling cyclists to use bike-sharing schemes.

We argue that the lack of interest in subjective perception of bike-sharing schemes might also affect negatively how these systems are planned and managed, thus threatening their long-term sustainability. To date, most studies on bike-sharing and urban planning have addressed the potential use of algorithms of modeling for the collection or distribution of shared bikes (either dock-based or dock-less ones), in the hope that urban planners would employ these developments at some stage in the planning process. This is not necessarily the case, as those in planning practice (either those working at local governments—UPOs—or in the private sector) often perceive information coming from academics as marginally relevant to their realities, and inapplicable [32]. Furthermore, recent evidence, indicates that trip data of bike-sharing users help bike-sharing companies to establish unequal relations with urban planning authorities, preventing them to collaborate with them [33].

As it has been said, until now, few studies have attempted to understand how PBSP are perceived by those in charge of designing and managing cities at a local level. This is an important point, especially in cities lacking a central urban planning authority or with weak governance systems like Santiago de Chile, or in other developing nations that have been dominated by a *laissez faire* influence resulting from the application of neo-liberal policies as in Chile [34].

The present article reflects on the sensitivities and perceptions of UPOs, responsible for planning and managing all aspects related to urban planning in their districts. Thus, decisions such as where to install a bike-sharing facility (either a bike path or a bike-sharing station), which parts of a district should be densified, or where to install green public areas are, altogether, part of their tasks that influence the functioning of PBSP.

3. Overview of Bike Sharing in Chile

The capital of Chile, Santiago—with more than 7 million inhabitants—is composed of 33 autonomous districts with no central urban authority (most regional cities, however, do not have such fragmented structure because the city government coincides with municipal structures; this is the case of medium-sized regional cities; however, Chile's three large metropolitan areas (Santiago, Valparaiso, and Concepción) are composed by more than one municipality). With regard to the existing public transport system, an extended metro network operates in an integrated manner with a large network of buses. Moreover, there have been major investments in urban highways crisscrossing the city in different directions, connecting the city with its suburbs, and contributing to urban expansion [35,36].

Santiago is known to be a very segregated city [37,38], with urban services and infrastructure being concentrated mostly in the East part of the city, where high-income groups live (see Figure 1). According to the local Transport Planning Central Bureau [39], about 4% of all trips were made by bicycle, registering an important increment from the 2% reported in 2002. This surge has been, however, unevenly distributed in the city. The wealthiest part of the city experienced a 586% surge in the use of bicycles in the period 2002–2012, compared with 128% in the rest of city. To some extent, this increment has been the result of the expansion of the bicycling network, which has increased from 20 km in 2002 to 386 km in 2016.

The first bike-sharing scheme started in 2014 in the district of Providencia (East of Santiago) when the municipality enacted a series of staff-run stations provided with bicycles around the district. Residents had to pay a small annual fee to be able to pick up bikes and run them for a 30 m period. The experiment lasted one year and was suspended after the arrival of Bike Santiago, a private company that employed self-service docking stations to pick up and drop off bikes.

Bike Santiago expanded to the wealthy district of Vitacura—east from Providencia—and progressively moved to more central and less affluent areas, reaching 17 districts and 132 stations by 2017, although the vast majority of stations were still located in well-off districts of the city. Further, when bike sharing stations were installed in poor districts, they tended to be located adjacent to metro stations and far away from residential areas, which made them unusable for most people. Up to this point, the vast majority of the Bike Santiago services were located in the East part of the city [40]. Membership of Bike Santiago had reached 25,000 users in 2017.

In addition to Bike Santiago, in 2015, another bike-sharing scheme, Bici Las Condes, started operating in the rich district of Las Condes, also in the East part of the city, providing 89 stations to 3200 users [41].

In 2018, Mobike, a dock-less bike-sharing scheme, started functioning in Las Condes and La Reina (another high-income residential district), but since then, it has expanded to more central and less affluent areas, reaching a total of seven districts in 2019, and about 30,000 users [42]. Figure 1a shows the three bike-sharing schemes in the city, while Figure 1b shows the distribution of socio economic groups in the city.

Despite this influence in managing urban infrastructure at a local level, the role of UPOs in the planning of bike-sharing systems in the city was limited. This is due to the fact that bike-sharing schemes in Chile receive no public funds to operate, and therefore they tend to work in high-income zones in the city, where most jobs opportunities and commerce locate. As a result, most UPOs had a limited influence on the operation of bike-sharing companies.

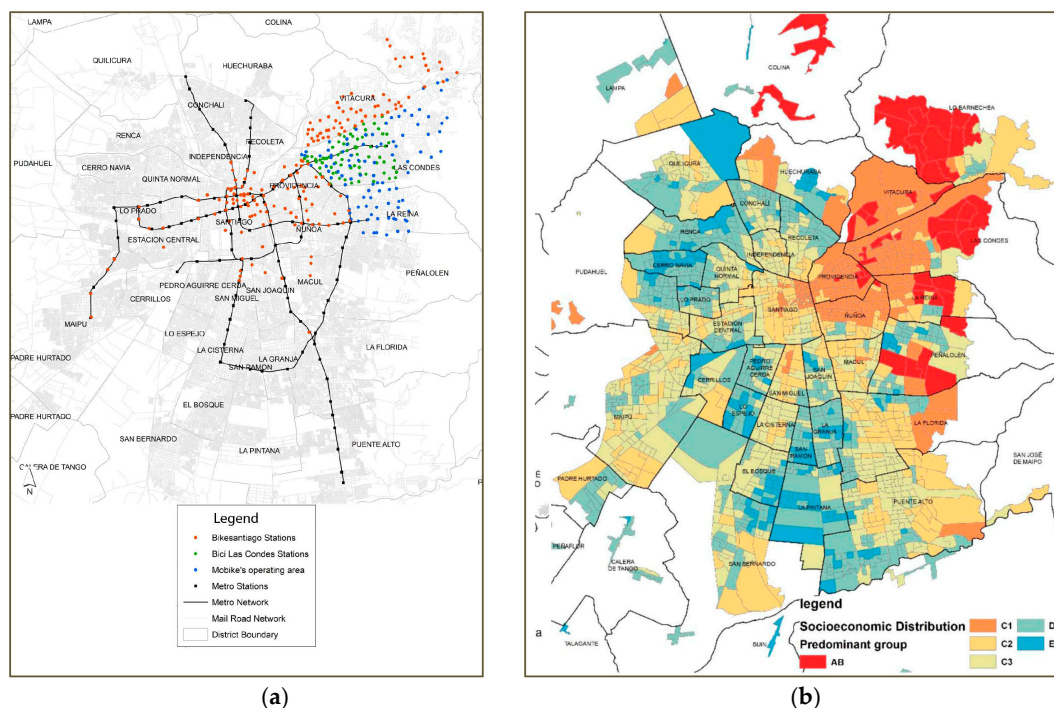


Figure 1. (a) Metro network and location of bike-sharing stations in Santiago. (b) Socioeconomic distribution of Santiago. The AB and C1 groups are the most affluent, while the E group is the poorest. Source: Elaborated by the authors.

4. Materials and Methods

The main goal of our qualitative data analysis (QDA) is to track distinctive patterns among UPO's testimonies—a highly descriptive approach that requires a multistage framework—in order to encompass possible avenues to answer our main research question: How are local planning authorities perceiving and managing the different challenges and needs of the different stakeholders involved in bike-sharing schemes in Santiago?

The core operations of our research are, indeed, highly descriptive in nature. Yet, raw testimonial data are not, in essence, explanatory or else sufficient to claim theory or hypotheses. A strong QDA requires making sense of data through iterative operations; to understand the nature of data and its further use, regarding more complex inductive and deductive analysis operations. Therefore, the collection and use of testimonial data requires to differentiate stages for data sensing. This also generally implies the use of a semantic framework—and in our case, as it will be further detailed, the use of the software Atlas.ti to distinguish QDA operations.

So far, recursive techniques to transform and interpret data are a standard of most QDA, yet not existing an absolute consensus on specific frameworks to be used—in contrast as it could be expected from the quantitative tradition [43]. However, the use of thematic analysis (TA) in advanced qualitative studies during the last decades has posed important considerations, regarding structured operations for content analysis, separating data sets, and the use of reflexive iterations, hence allowing concepts building, in a (qualitative) mixed-methods fashion [43]. The evolving tradition of TA is known as a comprehensive process for qualitative data classification, data reduction in large qualitative evidence

sets, and cross-referenced analyses, also suitable for building new approaches on developing themes, hence allowing researchers to build a series of potential hypothesis on the subject of choice [44].

Thematic analysis (TA) is known for its flexibility and wide range of use in the field of anthropology and psychology. The variations of such methods have been widely covered in the recent academic literature [44–47], reaching consensus in its particular use to link various concepts and opinions coming from discourse analysis or testimonies from interviews and/or focus groups, gathered in diverse situations, cultural contexts, and time spans.

Thematic analysis, moreover, is not bounded to specific coding operations and may share the use of techniques as those underlying grounded theory (GT) traditions, for instance. However, the central idea on the use of GT—that is, on concepts and theory rooted in qualitative data—requires an important level of abstraction, which may derive in issues for analysis replicability and inter-coding reliability in QDA. For overcoming these matters, our analysis sets different stages of analysis and regards to multiple methods combined in a linear process as presented in Figure 2, moreover distinguishing 5 phases of QDA.

Methodological framework: Linear model of analysis flow				
Focus Groups (FG)		Thematic Analysis - Core operations and data sensing levels		
Target Groups (G1 & G2)	FG sessions (Semi structured questionnaire)	1 st level of analysis, 'A':	2 nd level of analysis, 'B':	3 rd level of analysis, 'C':
- UPOs from districts with implemented PBSP	Collecting shared perspectives on: 1. The present use of PBSP, regarding: - 1.1. on the user-level experiences; - 1.2. on the planner-level experiences.	Categorization of data blocks as: - Descriptive events - Opinions - Reflections	Categorization of discourse patterns and thematic templates regarding: - Spatial context constituents (physical environment related to PBSP functioning) - Planning operations context - Cultural context (existing cultural context and patterns of adaptation if present)	Data groundedness (built on Grounded Theory precepts) - Identifying and counting preceding blocks from the 'B' level. - Connecting discourse patterns between different blocks of data.
- UPOs from districts without PBSP	2. On the cultural impact of PBSP 3. On the infrastructural conditions and challenges, regarding existing PBSP and future implementations.			'C' results: Assessing relationship between discourse patterns - Examples / possible avenues: - Accessibility and mobility thresholds in the use of PBSP at the user level. - Identifying planning challenges for existing and future PBSP implementation. - Intermodality factors and identified issues. - Overall assessment of the PBSP functioning at the district-planning level. - Cultural assimilation to PBSP and governance issues.
Phase 1	Phase 2	Phase 3	Phase 4	Phase 5

Figure 2. A synthesized linear-model proposal for methodological application. Phases 1 to 5 are meant to guide readers to understand the different levels of analysis in our process.

First, two focus group sessions permitted to gather UPOs testimonies. Focus groups have been increasingly used by urban planning in the last 20 years as means to elicit people’s perceptions on urban and rural topics [48], and therefore can complement information coming from more traditional methods, such as surveys.

Two target groups were defined on phase 1 to conduct our study, considering our specific aim to target planning authorities and their experiences with PBSP: (1) Urban planning directors from local

governments belonging to municipalities with running bike-sharing schemes and (2) urban planning directors belonging to municipalities without running bike-sharing schemes. It was hypothesized that both groups would have different views on the implications of bike-sharing schemes for their districts, as well as the cultural and physical barriers that these systems might have in their territories. These groups will be tagged as G1 and G2, as shown in Figures 2 and 3 and Table 1. A primary thematic analysis of this information allowed us to identify recursive topics and to categorize discursive patterns in phase 2 (see Figure 2).

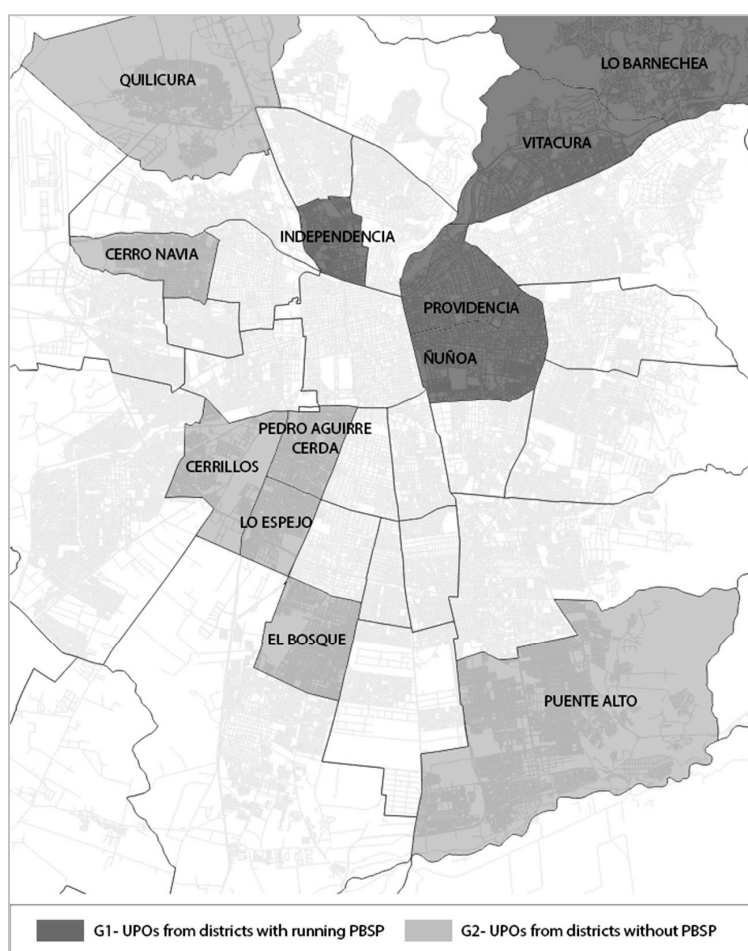


Figure 3. District locations of G1 and G2 groups.

Table 1. Profile of the two focus groups. Source: Elaborated by the authors.

Group name	Description	Group Size (N)	Common Objective
G1-UPOs Group One	UPOs from local governments belonging to municipalities with running bike-sharing These municipalities are known as well-off districts also covering the area where most bike-sharing schemes operate in Santiago.	7 participants	To understand the perception of bike-sharing schemes of those in charge of urban planning at district levels.
G2-UPOs Group Two	UPOs belong to municipalities without running bike-sharing schemes. These municipalities correspond to poor districts located in central and peripheral areas	8 participants	

From phases 3 to 4, the main operations relate to how testimonial data can be spread in a network view. Atlas.ti network views were used to sort strands of reduced and selected testimonies, using its capacity to sort and connect codes and memos in its software environment (semantic maps of data in network view). Data reduction was therefore connected to data display in different branches, initially identifying testimonies with their interlocutors. Open and process tracing coding techniques were used at this point [49]. This process was complemented with the use of InVivo codes—strands of testimonial information that stated packed information and complex arguments that would require further attention.

Phase 5—our third level of thematic analysis—is set to map reflexive iterations, in which GT precepts are engaged. These consider the use of data groundedness as blocks of information that may appear interrelated, for assessing the connections of previously grouped blocks of information, regarded as descriptive events, opinions, UPOs reflecting on their own skills and/or common tasks in planning activities, and their perception on the PBSP phenomenon in Santiago, and so on.

In this sense, groundedness should not be regarded only as a count of appearing and hypothetically connected blocks of information, but also as an important means to map and analyze the consistency of one or various statements relating to different events, conclusions, opinions, and else. These altogether describe UPOs main concerns on the functioning of PBSP—opening the path for a pre-theoretical approach. Figure 4 synthesizes these latter operations, conducted in a network view in Atlas.ti.

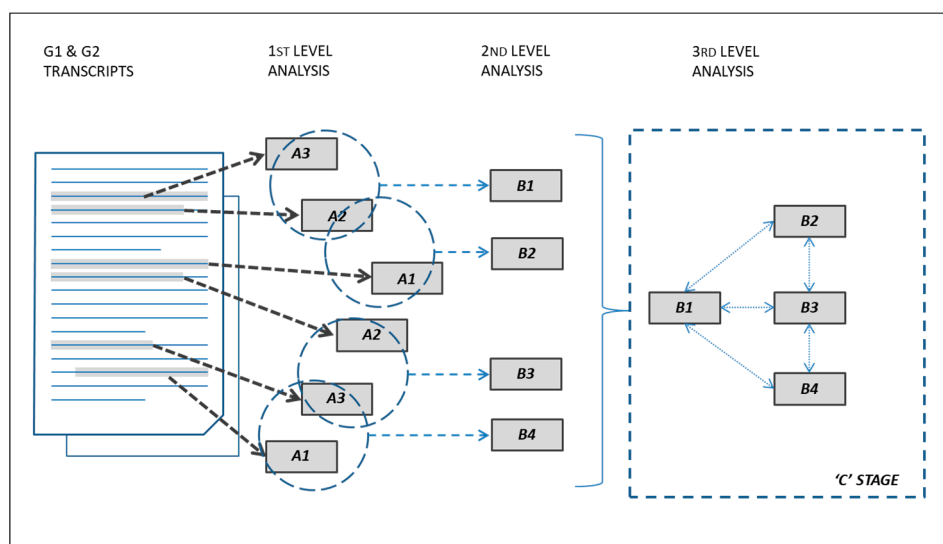


Figure 4. Graphic synthesis of our 5-phase linear model as earlier explained in Figure 3. Phases 1 and 2 are set on the focus groups data collection and transcripts. Phases 3 to 5 are related to thematic analysis coding operations, resulting in a semantic map of coded blocks of information (A, B, and C blocks). Data interrelations occur at the ‘B’ level, also setting the grounds for the final C stage, bringing further results and discussions.

Focus Groups Conduction

Our focus group sessions (G1 and G2) were organized and held in January 2019, portraying different aspects on the perception of PBSP. Both meetings followed the same structure: After a short introduction in which each participant presented general information about his or her district and its main challenges, participants were asked to comment on the effects of bike-sharing schemes in aspects of user-level known experiences and their planning concerns (phase 2 of our linear model in Figure 2).

Focus groups transcripts in G1 resulted in a total length of 6000 words, considering its seven participants. Meanwhile, G2 resulted in a total length of 7860 words with its eight participants. Special attention was given in the recruitment process to keep a balance of gender and socioeconomic status of participants. Moreover, in accordance with the requirements of CONICYT (Chile’s National Research

Agency), each participant was given a participant information form and was asked to sign a consent authorization before the start of his or her participation.

Table 2 shows the main characteristics districts belonging to Group 1 and Group 2. Group 1 was composed by seven people belonging to six municipalities (Vitacura, Providencia, Lo Barnechea, Ñuñoa, Independencia, all affluent districts with the exception of Independencia and Estación Central), while Group 2 was composed by eight people belonging to the municipalities of Quilicura, Cerro Navia, Puente Alto, Lo Espejo, Pudahuel, El Bosque and Cerrillos, all districts of medium to low income). Districts have a population ranging from 80,832 inhabitants (Cerrillos) to 625,551 inhabitants (Puente Alto) and show substantial differences in terms of the infrastructure allocated to bicycles.

Table 2. Profile of focus groups G1 and G2. Source: Elaborated by the authors.

District	Area	Population (2017 Census)	District's SOCIOECONOMIC Profile	Presence of PBSP	Bike Lane Network (km) (2020)	Bike-Sharing Stations
Vitacura	28	85,384	High-income	Yes	11.9	48
Providencia	14	142,079	High income	Yes	24	44
Lo Barnechea	1024	105,833	High income	Yes	0	15
Ñuñoa	17	208,237	Middle-high income	Yes	20.2	14
Independencia	7	100,281	Middle-low income	Yes	5.6	6
Estación Central	24	147,041	Middle-low income	Yes	10.8	3
Quilicura	58	210,410	Low income	No	6.5	0
Cerro Navia	11	132,622	Low income	No	2.7	0
Puente Alto	88	625,551	Low income	No	21.6	0
Lo Espejo	7	98,804	Low income	No	2.9	0
Pudahuel	197	230,293	Low income	No	2.9	0
El Bosque	14	162,505	Low income	No	5.9	0
Cerrillos	21	80,832	Middle income	No	4.6	0

5. Results

5.1. TA Coding Stage A

As aforementioned, the first stage of our TA approach is data reduction and its organization. These initially sorted testimonies were organized under the following coding categories—otherwise, data strands are packed under the following categories (first level of coding/analysis):

- Issues of empirical references (codes A1): Pertained to planning practitioners addressing their own experience in diverse real-life situations where PBSP have been implemented, along with other related situations, with regard to infrastructure conditions, challenges, and planning decisions altogether.
- Issues of critical reflection (codes A2): Related mainly to opinions and analyses, brought by planning practitioners while explaining and developing answers to questions that are prone to critical thinking.
- Issues of perception (codes A3): To explicitly provide opinions on matters with regard to both exposed empirical facts and critical analyses.

These categories correspond to thematic groups of testimonies, which are related to PBSP. Overlapped codes were grouped into overarching themes that might contribute to the understanding of people's perceptions of bike-sharing schemes.

5.2. TA Coding Stage B

As a result, from the first 'A' coding categories, data strands were classified according to their content, allowing the detection of 4 main thematic categories. These thematic categories were defined as:

1. Present infrastructure conditions and public space (B1 Codes): These codes sort all references to existing infrastructural conditions that enhance or neglect biking conditions in general and specially focused on the alteration of PBSP functioning—involving streets, walkways, parks highways, bikeways, metro stations, public transport lanes, etc.
2. Present planning conditions (B2 Codes): These codes seek to retrieve issues related to existing planning conditions that directly or indirectly affect the implementation processes and existing PBSP, whether related to urban planning practice in general or highlighting particular ordinances and/or legal mechanisms related to such practices.
3. Cultural adaptation processes (B3 Codes): These codes pertain to every process related to a change of conduct or conflicts of PBSP users, pedestrians, and users of other motorized and non-motorized transport modes altogether, for instance, the portrayal of conflicts between cars and bikes in the usage of street lanes, or problems between pedestrians and bikes in park areas.
4. Perceptions on the implementation of PBSP (B4 Codes): These codes refer to matters of opinion regarding the present performance of the existing PBSP—to spot opinions on the use of existing PBSP coming from UPOs and how these are related to matters of perception of urban bettering or worsening, for instance.

5.3. TA Coding Stage C

A total of 88 codes were mapped during the first stage of analysis in G1, retrieving mixed strands of information of empirical references (A1), critical reflections (A2), and issues of perception (A3), while on G2, 94 codes were retrieved. As the process evolved, these packed blocks of information—which can also be referred as coded testimonial strands—were filtered to identify different elements of discourse involving PBSP, related to matters of infrastructure (B1), planning (B2), cultural adaptation processes (B3), and direct references to PSBP implementation processes within Santiago and its districts—with and without implemented PBSP.

By using these data categories, it was possible to interrelate the displayed discourse elements and arguments in order to identify more complex relations in a deductive fashion, defining our 'C' stage of analysis (Figure 2). These are displayed as intertwined codes under the B categories, which are at the core of our TA. Tables 3 and 4 summarize these main findings.

In G1, issues relating to existing infrastructural and planning conditions were more resounding, exposing matters related to present and future challenges, packed with empirical references on how such are part of a daily basis of PBSP experiences as observed by UPOs. Moreover, the infrastructural challenges of PBSP implementation in these districts—operating with present biking schemes—were of central attention to UPOs.

In G2, more attention was paid to issues concerning cultural adaptation processes regarding the required infrastructure conditions—largely missing in the districts without implemented PBSP. This was moreover related to a series of issues regarding urban practice and the availability of both design and ordinance instruments, highlighting a lack of specific instruments for PBSP implementation.

This process of data reconstruction marks the beginning of the main topics of discussion, which will be covered in the following sections. As expected, this final stage of analysis is focused on analyzing relations among the different B Codes categories, in order to highlight issues regarding how PBSP are developing and evolving in the present context of planning practice. The inter-relation between these will be further discussed to consider a pre-theoretical approach.

Table 3. Thematic analysis (TA)—Stages A to B—urban planning officials (UPOs) in municipalities with public bike-sharing programs (PBSP) (G1).

G1—TA —Stages A to B—UPOs in Municipalities with PBSP					
A codes: data sorting	B codes: data thematic categorisation	Intertwined B Codes: data reconstruction and crossed-referenced analysis			
A1- empirical references A2 - critical reflections A3 - issues of perception	88 total codes	B1 Infrastructure	23 codes	B1-B2—Interrelated infrastructure and planning conditions.	6 intertwined codes
		B2 Planning	33 codes	B2-B3—Planning concerns and cultural adaptation processes.	5 intertwined codes
		B3 Cultural adaptation	23 codes	B1-B3—Infrastructural conditions portraying cultural adaptation processes.	5 intertwined codes
		B4 PBSP references	17 codes	B2-B4—Planning concerns in the implementation and existing PBSP.	5 intertwined codes
B1-B4—Infrastructure issues in the implementation and existing PBSP.	7 intertwined codes				
		B3-B4—Cultural adaptation processes in the implementation and existing PBSP.	5 intertwined codes		

Table 4. TA—Stages A to B—UPOs in municipalities without PBSP (G2).

TA—Stages A to B—UPOs in Municipalities without PBSP					
A codes: data sorting	B codes: data thematic categorisation	Intertwined B Codes: data reconstruction and crossed-referenced analysis			
A1- empirical references A2 - critical reflections A3 - issues of perception	94 total codes	B1 Infrastructure	35 codes	B1-B2—Interrelated infrastructure and planning conditions.	2 intertwined codes
		B2 Planning	22 codes	B2-B3—Planning concerns and cultural adaptation processes.	4 intertwined codes
		B3 Cultural adaptation	22 codes	B1-B3—Infrastructural conditions portraying cultural adaptation processes.	6 intertwined codes
		B4 PBSP references	23 codes	B2-B4—Planning concerns in the implementation and future PBSP.	6 intertwined codes
B1-B4—Infrastructure issues in the implementation and existing PBSP.	5 intertwined codes				
		B3-B4—Cultural adaptation processes in the implementation and existing PBSP.	5 intertwined codes		

5.4. Thematic Analysis Interrelations

- Progress perceptions brought by PBSP implementation (B1, B4)

Bike-sharing schemes were, in general, positively evaluated by UPOs. Since bike-sharing schemes introduce high-quality new bicycles into the urban space, they might help to revitalize urban spaces and to generate synergy with other modes of transport. Participants agreed that existence and quality of cycling infrastructure was a key factor in making existing PSBP a successful new form of mobility. According to UPOs from both districts with and without PBSP, the existence of segregated cycling lanes make cycling more appealing to new users, especially for those who are less used to cycling in the middle of traffic alongside motorized vehicles, as well as those interested in using cycles to cover the last mile.

- Infrastructural inequalities (B1, B2)

This led to a new topic, for cycling infrastructure in Santiago is highly unequal across districts: While central municipalities like Providencia and Santiago have invested significantly in cycling infrastructure in the last 15 years, poorer districts located in other parts of the city have neglected this kind of investment. Related to these conditions, it was argued that such inequalities are, nonetheless, somehow related to differences in income, as argued by some interlocutors in both focus groups. Participants of rich and poor districts in general were particularly focused on these disparities, and recognized the many obstacles (financial, bureaucratic, legal, and cultural), that make it difficult to overcome investment in infrastructure.

Such obstacles are, however, not an exclusive condition of economic disparities. For example, Vitacura, the most affluent district in the city, has considerably fewer cycle lanes, whilst the less affluent (but still so) district of Providencia has a relatively robust and well-kept network of cycle lanes as a result of long-term urban planning focused on sustainable transport. The lack of investment in Vitacura could, therefore, drive current planning investments for building more cycling infrastructure, while in the case of Providencia, planning decisions are more sensitive to the high demand for transport mobility and accessibility. This comparison also needs to take into consideration the differences of both accommodated districts: Providencia is part of the city's central core of mobility demands, while Vitacura is less central and, therefore, demands a different take on these respects. Indeed, districts' budgets determine, to a great extent, aspects such as access to green areas, supermarkets or health premises, or the quality of sidewalks. However, it is not the only aspect that determines the existence and/or quality of cycling infrastructure. Picturing inner mobility practices to understand such needs for connection is a key task that demands closer attention in the design and implementation of PBSP

- Cultural assimilation and the use of PBSP (B2, B3)

For the most part, the expansion of PBSP infrastructure in middle and lower-middle class districts in Santiago was perceived by local urban planners – most of whom worked in districts with no PBSP – as an important step to modernize and upgrade their neighborhoods.

in [the district of] Independencia we made a change in the local government [in relation to the recently elected major], the previous major was very unpopular, so all these things are perceived by people like improvements, like when the metro [Santiago's underground network] arrived to the district. Thus, the arrival of BikeSantiago was like saying: look at what we were missing out ... let's imagine, an orange artifact came to our neighborhood, it was like saying "finally we are being considered" "someone is spoiling us". (UPO testimony).

The latter reflection also brings to light cultural adaptations regarding users of PBSP. Furthermore, the arrival of PBSP seemed to crystallize a cosmopolitan lifestyle coming from sophisticated metropolises like London, Paris, or New York.

Most people understand that this “is what is coming”, the fact that there is an association with Paris or the Netherlands, people think that this is the right path, something like “Oh, it’s the same system of Paris. (UPO testimony).

- Infrastructural and cultural adaptation challenges (B1, B3)

Yet, despite these positive feelings, the operation of PBSP, in terms of both infrastructural and cultural adaptation processes, implied further concerns for urban planners. The most iconic situation brought to attention was the use of sidewalks and streets by inexperienced cyclists riding shared bicycles, causing numerous problems for pedestrians, urban transport busses, and car drivers.

In the case of sidewalks, urban planning officials did not seem to make hard distinctions between users of shared bikes and those using their own bikes, noting instead that the increasing number of cyclists, the absence of a robust network of cycling facilities, and a reluctance of car drivers to share lanes with cyclists left cyclists with few options. As a result, continuous fights on sidewalks between pedestrians and cyclists were depicted in different areas of the city, involving serious accidents that mostly affected pedestrians. A recurrent explanation on these issues was the high speed of moving bicycles, also making pedestrians feel unsafe on sidewalks.

- Beyond infrastructure and the role of planning in promoting a new biking conscience (B3-B4)

It was nonetheless argued that, despite these difficulties, a more mature and responsible cycling culture is emerging at sight. It is unknown, however, how such a process is actually occurring, leaving chances to further explore this phenomenon on cultural adaptation and safety regards.

To some extent, the introduction of PBSP is perceived as a landmark for the bicycling grassroots movements in the city. Indeed, the presence of stations and different types of bike-sharing schemes is seen as a turning point for urban planning, in which a new actor, the bicycle, has been officially incorporated as a mode of transport. The consequences of this are various; on the one hand, the bicycle demands the transformation of existing legislation, which, until now, has considered only two modes of transport—vehicles and pedestrians—and, on the other, it implies that urban planning practice should consider the demands of a growing number of cyclists.

[T]he urban law [ordinance] is behind the bicycle, [and] to me this is the main reason behind the conflicts emerge either on roads, between cars and bicyclists, or in sidewalks, between cyclists and pedestrians. (UPO testimony).

Besides these urban implications, PBSP were considered as having positive implications for those who use them. One was comfort and efficiency: PBSP would permit users to overcome safety issues related to bike theft, a growing problem in the streets of Santiago. In addition, ready-to-use bicycles were considered a good selling point for those unable or unwilling to maintain their own bicycles or those lacking storage capacity in their houses.

- Mobility and accessibility planning needs at sight (B2, B3)

According to UPOs from both groups, PBSP should be considered part of a larger mobility system that might help other modes of transport (especially the metro and bus networks) in permitting people to reach their destinations. However, this aim collides with a diverse range of obstacles. Car drivers tend, unsurprisingly, to reject the construction of cycling facilities, including bike-sharing stations, especially when these imply the reduction of car lanes or parking space. Neighbors might also be opponents of bike-sharing facilities, especially when these make the movement of cars more difficult or are in proximity to pedestrians, as in the case of school entrances. Despite these difficulties, participants recognized the role of cycling activists and organizations in both promoting cycling as an effective mode of transport and alleviating disputes with other users of streets. Finally, the role of the local and central government in making the operation of PBSP feasible emerged as an important topic in

the conversation. Participants commented on the relative weakness of transport policies aiming at enhancing cycling in the city, as well as the series of bureaucratic barriers that projects related to cycling have to face in order to be approved and constructed.

Participants declared that sometimes projects related to cycling infrastructure are dismissed because of the resistance voiced by neighbors or shop owners, who often feel that cycling infrastructure might negatively affect their neighborhoods, either by attracting new users to residential areas, or by making it more difficult for visitors or locals to park or to move in cars. Often, these fears received support from weak political administrations, causing cycling-related projects to be modified or cancelled altogether.

“The truth is that all factors and actors underline the difficulty to consolidate the necessary cycling infrastructure projects, and on top of this there is an anxiety on the part of urban planners of having little support from communities to implement cycling projects”

Furthermore, the lack of data on bike trips coming from PBSP meant that participants were cautious in making resounding claims on the implications of bike-sharing schemes in that matter.

- Lacking planning partnerships (B2, B4)

UPOs from both districts with and without PBSP complained about several aspects of the functioning of PBSP. On the one hand, they stated that in some stations, especially those close to metro stations, replenishing of bicycles was poor, meaning that often no bicycles were available for users.

The main concern was related to the lack of collaboration with bike-sharing companies, which do not provide data about bike trips, necessary to improve urban conditions, to local planning agencies. Bike-sharing companies were seen as ambiguous, complicated, and uncommunicative organizations, concerned with their own goals (namely, to enlarge their client base), with little interest in establishing alliances with local governments. Another concern of UPOs on the present functioning of PBSP was related to their required payment methods, as all existing PBSP in Chile demand users to pay thorough credit card or bank account transfers. Urban planners mentioned that, in order to include low-income groups, PBSP need to incorporate other forms of payment. A similar concern was mentioned in relation to the skills needed to use the system. According UPOs, IT skills associated with the management of PBSP act as a barrier for certain groups (people with little education, old people with limited cognitive abilities, etc.), in the use of these facilities.

- City governance (B2, B4)

The governance problems of Chilean cities emerged various times in the discussion with UPOs, who complained about their incapacity to plan a coherent inter communal path network, since most of the investment on the matter comes from their own districts. The acute differences in municipal budgets mean not only dramatic differences in cycling facilities across districts, but also in drastic changes in the quality (width, level of segregation, continuity) of these facilities. Furthermore, a dispersed and underfunded governance means that some districts do not have any type of local urban instrument (Plan Regulador Comunal) to guide cycling investment or have weak technical expertise on that matter.

As with cycling facilities, UPOs complained about the unwillingness of existing PBSP for collaboration, and their poor leverage to force a modification of what they perceived as unbalanced contracts with PBSP companies. Thus, in the absence of a city-level agency responsible for organizing the different transport infrastructure of the city, urban officials perceived their role as secondary, constrained, and inefficient.

There was an implicit agreement on the fact that, in order to move forward, a sustainable agenda on cycling and a strong political leadership is necessary, either at a local level, or coming from the central government. However, with the exception of two districts in Santiago (Providencia and the district of Santiago), no other municipality exhibits this level of commitment to cycling.

5.5. Summary of Results and Pre-Theoretical implications

“How are local planning authorities perceiving and managing the different challenges and needs of the different stakeholders involved in bike-sharing schemes in Santiago?”.

From the preceding results, we could refer to six coexisting topics for discussion: (1) On lifestyle considerations and the revitalization of the urban image, (2) on the emergence of a cultural shift that prompts a bottom-up perspective, (3) the constant characterization and comparison of poorer and richer districts with regard to inequality factors in planning and infrastructure conditions, (4) governance and the lack (or else need) for a central authority bringing a top-down perspective, (5) lacking partnerships or else the solo-operations of private PBSP initiatives, (6) plus (un)claimed intermodality purposes and how PBSP should help people reach their destinations.

These categories could be further engaged in other cities, considering Santiago as a case-study among a population of Latin-American cases experiencing PBSP implementations.

However, different hypothetical outcomes could have emerged in case of decentralized initiatives from both public and private PBSP, further contrasting matters as the reasonable need for a top-down governance/policy control, or else the need to reinforce the emerging bottom-up cultural shift on bike usage. Also, more research efforts could be required in unfolding how PBSP developments could be reflecting or else contributing to maintain existing inequalities or constraints, with regard to both planning and infrastructure conditions. Similarly, the strong claims of PBSP revitalizing the urban image and its lifestyle implications may be undermining the intermodality and accessibility purposes of such modal alternatives which, in part, could be related to the unregulated implementation of PBSP initiatives.

In addition, contrasting and comparing both G1 and G2 in the latter stages of our linear methodological framework showed that there are no such substantial differences when it comes to portraying UPOs perceptions in the Santiago case. In other words, discussion patterns do not appear to be affected by the prior existence of PBSP in city districts, as there are other factors such as planning disparities and infrastructure gaps that are commonly referred by both groups.

6. Discussion

The conversation with UPOs opened a series of urban topics, some of which were not strictly related to PBSP.

First, it was noted that UPOs perceived PBSP as having a resounding impact in terms of mobility and accessibility of people and in terms of urban vitality, in line with existing literature on the matter [10,24]. However, the diminished interaction of UPOs with these systems, and the absence of institutional apparatus in charge of these schemes are causing UPOs to be skeptical of the real contribution of these systems to the functioning of their districts. This, in turn, has shed light on two main topics: urban governance and urban inequality.

Many of the complaints of UPOs relate to city governance, or the lack of such when a central authority is missing in a large metropolitan region like Santiago, in charge of transport investment and management. Indeed, the very fact that there were two groups of UPOs, those with and those without PBSP shows, to some extent, the failures of urban governance in the city. The absence of a city-level administration means that there is little or no control from the central or local governments over what kind, and under which conditions, alternative transport facilities can operate in the city. As it was mentioned earlier, Chile’s neo liberal policies have dominated urban planning in the last 40 years, meaning private urban investment focus is directed basically to areas housing high-income groups, while little or no investment goes to poor places. A case in hand is PBSP, which operates mostly in well-off places, which seem to accentuate current urban inequalities.

The majority of participants described operational problems such as having information about trips of bike-sharing users, as well as complaints on the unequal and often discretionary distribution of bike-sharing stations in the city, which is, therefore, connected with a lack of support from a central authority to proceed with reinforced strategies to cope with these problems.

This, in turn, creates a series of implications for local governments, forcing them to either plan PBSP internally, as in the case of the district of Las Condes, or to attempt to coordinate with neighboring districts. In both cases, weak governance diminishes the operational capacity of PBSP, and stresses the need for creative partnerships between private companies, customers, and local governments for the better functioning of PBSP.

Weak governance does not only affect how PBSP are managed, but also the characteristics of vital infrastructure for the functioning of PBSP, such as cycle paths. Cycle paths are planned mostly with funds managed by each district. Moreover, this is dependent on the political will of Mayors, and the availability of resources to build these cycling urban upgrades. As a result, the current cycle paths network is discontinuous (it drastically changes from district to district), with abrupt changes on the level of segregation and quality (cycle paths change in terms of their width, level of segregation with respect to the street, and in their construction materials and riding surface), and distribution (cycle-paths are concentrated in rich and central areas). The challenge is then to construct a collaborative type of governance, one capable of enhancing people's creativity and desire to upgrade the city, and, at the same time, to coordinate these aims at a higher level in order to deliver sustainable solutions [50].

Due to this shortcoming of governance, urban planning officials were thankful of this activity as it enabled them to know each other and to share some of their daily tasks. It also gave them the opportunity to be aware that some of the problems they had to face on a daily basis, either within their own districts or those emerging from the dialogue with ministries or agencies from the central government, were common to all participants. However, the most important aspect emerging from these kinds of research activities was the opportunity to make appointments, share information, and define common strategies and synergies among UPOs to make urban planning unfold and progress in more than one district. In the case of PBSP and cycling in general, UPOs used alternative ways to deal with the planning and management of PBSP.

Considering the latter, we find it important to reflect on the use of qualitative research methods for the study of bike-sharing schemes. Despite the fact that focus groups have been proven to be effective methods to collect subjective information and opinions about complex topics, until now, few studies have employed them to understand the implications of contemporary forms of mobility such as PBSP. Further, to our knowledge, there has been no attempt to integrate such research tools for facilitating communication among UPOs, considering the lack of a central authority guiding such instances. In our case, these field research tools unexpectedly aided in facilitating communication between different UPOs, revealing a much-needed space of conversation, to develop rarely discussed (yet long thought) concerns on the phenomenon of PBSP.

In addition to governance, inequality took a central part in the conversation with UPOs. In Chile, municipal revenues come mostly from business and commercial taxes that are concentrated in few districts, meaning that substantial differences in municipal budgets (after adjusted by population) can be found in the city. As a result, huge variations exist in access to public resources such as parks, public schools, sidewalks, bus stops, urban furniture, or cycling facilities. The fact that all PBSP operate almost entirely in wealthy zones, with access to well-kept sidewalks and parks, and vital commercial zones, reflects (and reinforces) and exemplifies this situation. This, in turn, intensifies the well-documented segregation that characterizes Santiago [51–53].

However, PBSP are having positive effects not only in affluent parts of the city but in less-well-off zones, too. UPOs' opinions suggested that the presence of shared bicycles in an urban space promotes contemporary lifestyles for the population. These lifestyles seemed to embody a certain cosmopolitan atmosphere that make the urban environment look more modern and connected to distant and vibrant places that most citizens experience only through media. Further, the presence of bike-sharing users in less affluent zones contributes to "spread" these lifestyles and, to some extent, helps to blur the subjective perception of urban space that dominates Santiago [54].

In summary, urban planning officials consider public bike-sharing programs (PBSP) as interesting and effective methods to promote cycling in the city. Those in charge of planning the city also perceive

that PBSP contribute to make cities more livable and to improve their image, especially in deprived areas. However, factors such as the absence of a robust and connected cycling network, high levels of inequality between districts, and a weak city governance, are perceived as barriers to the expansion of bike-sharing systems. Overcoming these issues is key in order to create more sustainable cities, not only in Chile but also in the whole Latin American region.

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