



Space and spatial practices in times of confinement. Evidence from three European countries: Austria, France and Poland

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Abstract

In the first half of 2020, millions of people were subjected to drastic restrictions aimed at limiting the spread of the Covid-19 disease. Austria, France and Poland have implemented a lockdown to varying degrees and for varying lengths of time. This is an unprecedented situation in Europe: until now, even in times of war, curfew measures have never been applied 24 h a day. The research presented in this article was carried out in real time, in April and May 2020, with the help of urban planning students from three countries. Its objective is to observe the interaction between these measures and the urban space in two dimensions. On the one hand, we analyse the impact of these measures on the urban space and on the spatial practices of the inhabitants. On the other hand, we examine the conditions which different types of urban and rural space have provided for the inhabitants experiencing confinement. This empirical study leads to a discussion and recommendation for the town planners of the future.

Keywords Spatial practices · Urban space · Lockdown spatial effects · Covid-19 pandemic

Motivation and context of the research

Abandoned streets and public spaces, almost non-existent traffic, or people queuing to enter the shop while keeping a recommended distance, etc., that we all keep in mind the shocking images of spring 2020 in Europe. From March 2020 onwards, European governments imposed unprecedented measures on their populations to slow down the transmission of the disease called Covid-19, the news of which had already been broadcast early January by the

European Centre for Disease Prevention and Control (CDTR 2020)*****. European populations have not experienced this kind of limitations, probably since the 1918 influenza pandemic (Parmet and Rothstein 2018; Batty 2020). Restrictions such as social distancing, the obligation to stay in one's home, restrictions on movement, etc., were introduced. From one country to another, the duration and severity of these restrictions varied; however, everywhere they were both unprecedented and difficult to handle for society.

The discussion on the relationship between health and planning as well as health and city is already well-settled within the academic discourse (e.g. Barton and Tsourou 2000; Crawford 2010; Hunting and Gleason 2012; Kent and Thompson 2012; Barton and Grant 2013; Leeuw and Simos 2017). More specifically, the impact of infectious diseases on cities has also been tackled (e.g. Alirol et al. 2010; Blendon et al. 2004; Katz et al. 2019; Parmet and Rothstein 2018), however, this question within the context of European cities has rarely been mentioned in the literature. If so, the publications typically referred to the influenza pandemic which broke out in the second decade of the twentieth century. It could be easily explained by the fact that the pandemics which broke since then (i.e. SARS in 2002 or influenza A H1N1 called "swine flu" in 2009) did not affect much Europe. The debate, following the Healthy Cities Project launched

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in 1984 by the World Health Organisation and involving a number of European cities, was mostly focusing on the question how urban planning can provide and promote a healthy environment for the inhabitants (Ashton and Thurston 2017). Since the late 90s, the general climate of discussion favoured to include the issues of sustainability, integrative planning (WHO 1997) and participation (Barton and Tsourou 2000), although the latter issue has been already elaborated by Duhl (1963) or Fitzpatrick (1978) before. Main problems were seen in inequalities, “health-aware” design and lifestyle (e.g. in encouraging healthy mobility and more general physical activity) (e.g. Barton et al. 2003; Leeuw and Simos 2017). Thus, for Europeans, the real threat caused by the infectious disease came as a shock.

Somehow Europe, despite experience from the past (e.g. Black Death 1331–1353), forgot how deeply epidemics can impact urban fabrics, infrastructure and city life (Allam and Jones 2020). In this part of the world, the discussion on urban crisis management focused more on dealing with natural disasters (see, for example, Bakema and McCann 2019; Zevenbergen et al. 2018). This is why we all lack knowledge of how contemporary European urban societies would deal with the restrictions caused by the epidemic and in what way the urban structures could facilitate behaviour that slows the transmission of the disease. Since spring 2020, we are able to collect evidence documenting the way European urban societies responded to the dangers of infectious diseases and to what extent the urban structures can facilitate the fight against this danger. In times of a pandemic, there is clearly no time for designing an urban space anew to help safeguard the behaviour that is considered appropriate during epidemics (e.g. social distancing). However, urban planners can learn how to rearrange urban space for future events of this kind, which are very likely to happen (Alirol et al. 2010; Parmet and Rothstein 2018). This can apply to both public spaces and the temporary facilities needed during epidemic. In other words, the current crisis forces planners to rethink “our relationships with the places where we live or work” (Scott 2020).

Hence, such a crisis has a particular implication for the urban planner: it forces the city to function in a way for which it was not planned, and even contrary to what it was planned for. Activities, buildings, traffic routes, parks and public spaces became empty and forbidden places as of mid-March 2020. Economic activities and the maintenance of public spaces were suspended. The life of the inhabitants has been confined to their homes, sometimes extended to a balcony, terrace, or a garden, for an unknown period of time.

In this context, our very first objective was to document such an unprecedented situation by bringing together reliable material, in real time, and with the means available to us in those circumstances. The data were collected shortly after the lockdown came into force, in April and during the first weeks of May, in Austria, France and Poland. We mobilised

groups of students who were confined and to whom we had to provide distance learning.

More broadly, our aim was to observe the interaction between the implemented lockdown measures and the urban space on two dimensions. On the one hand, we analysed the impact of these measures on urban space and on the spatial practices of the inhabitants. On the other hand, we examined the conditions which different types of urban and rural space have provided for the inhabitants experiencing lockdown. Because of the novelty of the situation and its evolution, we decided to adopt an empirical and open-ended approach.

The evidence presented in this article reflects this research framework, adopting a comparative approach. We followed the same observation protocol in the three countries. The different impacts on urban structures and people’s behaviour are assessed against the background of the intensity and severity of the confinement measures, as well as the cultural traits of the three countries. We adopted a common typology in which the case studies are classified according to a spatial context, ranging from rural to urban situations. The use of public and private spaces, the adaptation of behaviour and patterns of mobility in these different types of built environments are addressed in the typology.

The paper is structured as follows. First, we present the methodology that is applied to the data collection and the framework of its analysis and interpretation. Moreover, we briefly discuss the categorisation defined in this study, which came out of the cases we were able to collect. In the following section, we describe the results of our research in both qualitative and quantitative categories. Then we discuss the results in terms of the territorial behaviour and changes in space caused by the lockdown rules that came in force in European countries in spring 2020. Finally, we summarise our research and conclude our study with general recommendations for the future.

Methodology

A research protocol for times of confinement

The methodological framework for this research was designed to be implemented in France, where the population was subjected to very strict confinement. It was forbidden to go out for more than one hour per day and at a distance of more than one kilometre from their home, and it was compulsory to fill in a prior authorisation for any exit, dated and signed, to be presented in the event of a check, on the pain of a fine of 135€. In other countries such as Austria and Poland, which are presented in this paper, the rules were also very strict but not to the extent of those in France, especially regarding mobility limitations. This situation called into question the usual research methods. Faced with the drastic change in the use of



space, sustained observation seemed essential; however, the restrictions on mobility did not allow one to go out into the field. The adaptation of populations to the new situation called for an interview strategy, yet the rules of social distancing did not allow face-to-face interviews to be conducted. The interpretation of opinions collected through online questionnaires or telephone or video meetings is always delicate. It was even more so because of the situation of the potential interviewees, inhabitants or decision makers. Locked up at home, they only had the information appearing on their screens at their disposal without being aware of the reality experienced by the society. This made it very difficult to distance their reality from the messages conveyed by the media. Finally, the psychological stress linked to the fear of the disease as well as the confinement could have led to biases which were difficult to evaluate in real time. We are only now (autumn/winter 2020) beginning to have access to data which allow us to measure the shock caused, such as the reported rise in domestic violence (e.g. Ravindran and Shah 2020). Additionally, we took into account that interviews, and particularly ad hoc questionnaires, not always are the best source of information on the topic being researched (e.g. Stephens-Davidowitz 2017).

Thus, given the challenges with typical research methods, microobservation seemed to be a suitable and valuable means of collecting real-time data capturing the inhabitant's experiences of lockdown measures.

Our study aims to describe and analyse people's behaviour in the public space and how this conduct can affect the space itself as well as the evolution of these phenomena throughout the confinement. Taking into account the limitations in mobility, we invited our students to make systematic observations using the same protocol. This protocol allows the results of real-time research to be compared across countries with different confinement measures and different cultural contexts.

While the material collected is quite rich, this article only exploits part of it and focuses on the development of a first set of interpretative hypotheses.

The observation was conducted from 30 March to 15 May 2020. In Austria, 22 students from the Smart City Master programme at the Salzburg University of Applied Sciences worked in 11 pairs. In France, 30 students from the Licence de Géographie et d'Aménagement de Sorbonne Université (Paris) worked individually. In Poland, the observation was made by 32 students from the Spatial Development programme of the Gdańsk University of Technology, of which 25 were from the 6th semester of the Bachelor's level and 7 from the 1st semester of the Master's level. Their results were carefully examined, and in the end, we accepted 10 cases from Austria, 25 from France and 32 from Poland, which amounted to 67 case studies and datasets. Initially, we did not know where our students would be confined. We assumed (which turned out to be correct) that they would be in different urban and rural environments.

The students worked as follows. First, they had to present the urban, economic and social composition of their spatial environment (i.e. an urban block), to become aware of its major characteristics. They presented on maps the site, its context and essential information such as land use, urban fabric, morphology and density.

Second, they had to evaluate the day-time and night-time occupation of the buildings both during ordinary times and times of confinement. Students were asked to count or assess the number of flats, offices and other activities (for example, by looking at the doorbells and information on the facades during their legally allowed walk) in each building located in the selected site and estimate the number of people living, working and visiting the place. They presented the results in a table, indicating the figures obtained and how they had calculated them, and then drew up maps of the occupation of the buildings.

Third, the students had to carry out an observation from the window, twice a day for fifteen minutes, at a fixed time. They had chosen individually two 15-min time slots between 7 a.m. and 9 p.m. that had to remain the same during the entire study, which lasted at least 14 consecutive days. Everyone had to define the visible area of the observation and document it on the map and on the photos. This observation had a quantitative component, counting the flows observed by type (pedestrians, individual vehicles, utility vehicles, public transport) and a qualitative component, behavioural observation. The results were entered in real time on Google Forms. The teacher checked the reliability of the results in relation to all observations.

Finally, each student had to produce an observation report, to present his or her data and analysis. We assumed that students would have a basic knowledge about the site because they were either living in the place during their studies or they decided to go back to their family home (typically to their parents). This proved to be correct, and it helped the students in realising their assignment.

On a pedagogical level, this work was very much appreciated. The students have provided a considerable amount of work, both in quantity and quality. Many of them expressed their satisfaction. Working on a well-known district led them to look at their neighbourhood from a different perspective but also gave them a better understanding of the practical implications of urban planning choices on the daily lives of the inhabitants. They appreciated also the direct and practical use of their actual knowledge and skills in responding to the difficult situation. The pedagogical and research effects of this kind of collaborative staff-student endeavour require a separate in-depth elaboration, and, for this reason, are not included in this paper.

From a research point of view, the data collected are highly reliable, particularly thanks to the very systematic framework offered to the students. In their reports, the students analysed and interpreted their observations trying to



understand what they had seen. More unexpectedly, a number of them took a critical look at themselves, using their personal experience of confinement as an additional element to make hypotheses and recommendations.

Analysis of the data

The data were analysed regarding two criteria, the extent of the disturbance suffered and the characteristics of the territory.

The extent of the disturbance suffered was largely determined by the constraints imposed on the inhabitants. These restrictions varied across countries in terms of severity (general or partial) and duration. France's situation was extreme, where a general and long-term confinement (comparable to Italy or Spain) was imposed. Once the restrictions were put in place, it was no longer possible to change the place of confinement for any reason. Austria and Poland corresponded to an intermediate situation, with a less rigorous and shorter duration of confinement (comparable to Germany or Czechia). No country that took a more flexible approach, such as Sweden, was present in our study. The other measures relating to hygiene practices and social distancing, which were complementary to confinement, did not play an important role in our study.

Additionally, we constructed a typology of the observed places based on the assumption that the effects of confinement should vary according to the spatial structures, their density and morphology, the presence of green spaces or basic services, etc. (Fig. 1).

To allow comparison, the typology should be kept as simple as possible. Initially, we considered three types of built environment: urban, suburban and rural. However, during the analysis, it became clear that the suburban type would not be retained for three reasons. First, the number of cases was too small to draw general conclusions. Second, the spatial characteristics of this category were not sufficiently different from the others. Finally, all suburban cases that were studied had urban characteristics with grouped, collective or individual housing. Consequently, only two types of built environment were selected: urban and rural.

Within the urban category, the cases displayed considerable diversity, which raised the question of a further subdivision of this category. Two options were discussed: the typology based on urban morphology and the typology based on dominant land use. We decided to use the latter because the limited time did not allow us to carefully connect urban morphology with specific behaviours. The land-use typology gave us the advantage of being able to make hypotheses about the correlation between the urban structure and the identified spatial practices.

Thus, within the urban environment, we distinguished places located in (1) urban centres, (2) multifamily housing areas, (3) single-family residential neighbourhoods and

(4) mixed-use areas. Surely, these subcategories are broad enough to encompass a variety of urban structures and morphologies. For example, in the category "multifamily housing areas" there are places located in historical districts, usually organised in urban blocks, but sometimes also arranged in other patterns, functional districts, housing estates of prefabricated houses and others. We are also aware of the varying sizes of the cities where our research occurred. Our sample includes large cities of global (Paris), European (Vienna, 3City: Gdańsk-Gdynia-Sopot) or regional scale (Reims, Olsztyn, Salzburg), as well as small or medium-sized cities with 5000 to 50,000 inhabitants.

Our sample was not large enough to integrate the size of the city into our typology. However, our conclusions do address the question of urban largeness as a differentiating factor in the experience of the inhabitants in times of confinement: an apparent paradox, since everyone stayed at home.

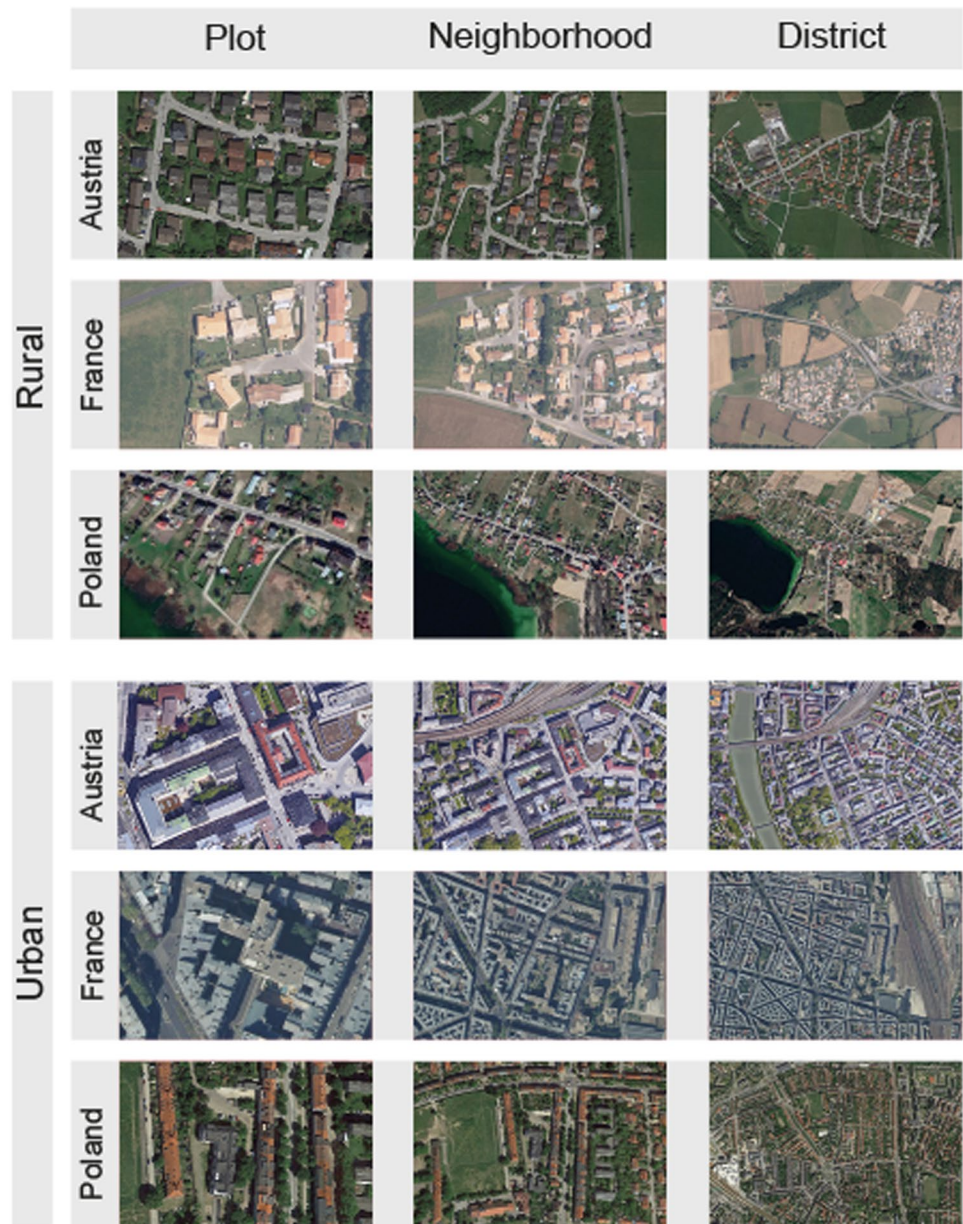
We decided to consider rural areas as a whole, bearing in mind that they are also varied. Among our case studies, we have "traditional" villages with their complete rural structure and suburban rural areas too. There are also very small hamlets (up to 150 permanent residents) in our catalogue, where many buildings are the second homes of residents from other places. Despite all these differences, the impact of the confinement rules on space and spatial behaviour has not varied significantly across the types of rural areas.

We tried to incorporate into our analysis the scale at which the impact of the lockdown could be observed. Because of the confinement rules, students could not move far from their homes (for example, a radius of one kilometre in France). We were, therefore, unable to analyse the impact of the lockdown at the scale of the whole city, especially in the case of large urban structures, and thus, we limited ourselves to the local level. We analysed the impact of the restrictions on (1) the immediate vicinity of the observer (i.e., plot, block, arrangement of buildings), (2) the neighbourhood and (3) the district. In rural areas and very small towns, that scale could include the entire settlement.

In addition to the analysis of the students' reports, the authors of this article were able to observe the entire space of a city throughout this period. In Poland, the co-author worked as a volunteer to fight the pandemic, allowing her to move freely through the city of Wrocław and to make many observations along the way. In Austria, there was no limit to bike rides, which enabled the second co-author to observe the city of Vienna. In France, the third co-author was given a prefectorial authorisation to drive around the city of Reims and its surroundings. The discussion in Sect. 4 also takes the authors' observations into account.



Fig. 1 Matrix of the study: typology of the places of observation and scale of the spatial impact observed



Results of the study

Confinement rules in three countries

In March 2020, European countries, having observed the increasingly worrying situation in Italy, started to impose new regulations aimed at protecting their societies from the spread of the virus SARS-CoV-2, causing the disease commonly known as Covid-19. Typically, the restrictions enforced drastic limitations in mobility (confinement), closure of national borders, quarantines and sometimes even a curfew. These measures, of course, aimed at decreasing contact between people. The majority of public institutions, including schools and universities, as well as private

businesses have been closed or forced to suspend their normal activities.

In this paper, we will focus only on the regulations that were in force in April and the first half of May 2020 when our study was carried out. Furthermore, we will discuss only the regulations which are expected to have a spatial impact. The restrictions can be arranged in five main categories:

- border restrictions which describe regulations for people entering each country and quarantine rules for these people,
- activity restrictions which include the way public and private institutions and businesses were allowed to operate,

- mobility and public transport restrictions which describe how people's mobility was limited and how public transport was operating within defined constraints,
- sanitary restrictions which describe rules of social behaviour, including social distancing,
- restrictions on the use of public space, which describe under which conditions using public space was permitted.

“Pandemic laws” in all mentioned types of restrictions can be considered as violating people's fundamental rights like, for example, right to liberty, right to freedom of movement, right to privacy or right to peaceful assembly. However, this aspect of restrictions is not elaborated in this paper.

We also analysed how the rules were evolving over time and realised that the strictest rules were in force typically in the first half or even the first three weeks of April 2020. In two countries—Austria and Poland—the regulations were quite comparable, and they also came in force and have been revoked in similar periods. However, the regulations that have been in force in France look not only stricter but also they lasted longer. For example, the government enforced a specific document called “*Attestation de déplacement dérogatoire*” (Derogating travel certificate). The document was a declaration stating the date and hour when a person would leave their home and had to be filled in each time the person went out. The document specified a limited list of approved reasons for going outside, and the bearer had to carry along all justifying documents as well (e.g. medical appointment, summon from the court). The declaration could be downloaded online. It could also be found printed in newspapers or one could make a handwritten copy. A number of shops were selling copies at a price of 0.25€ to 1€. The fine for going out without the document ranged from 135€ (for the first offence) to 3750€ and a 6 months jail sentence (for the fourth offence), regardless of whether the mobility was considered legitimate. As a consequence, we expected French people to adhere to the regulations more strictly than Austrians or Poles. The excessively high fines for breaking “the lockdown rules” (e.g. entering closed green areas) were also present in Poland where the administrative fine (thus, the fine could be appealed) varied between 5000 PLN and 30,000 PLN (approx. 1125–6750€).

Table 1 presents the most important confinement rules in the three analysed countries.

Impact of confinement rules on space and spatial behaviour

Our study has been conducted in “randomly located places”, depending on where the students decided to spend their confinement. However, with the number of cases, we can

actually quite accurately look at a variety of places and draw more general conclusions.

Before delving more deeply into the results, we would like to present a brief statistical overview of the location and characteristics of the cases studied. 67 cases have been analysed, of which 52 were located within an urban context and 15 were in rural areas. Among the towns and cities where our study was conducted, we identified 28 cases that were located in settlements with a population exceeding 50,000 residents. Two out of these 28 were located in one of the biggest European cities (Paris).

In Austria, ten cases have been selected:

- 3 cases in bigger cities such as Salzburg and Linz
- 1 case in a midsized town of 10,000 residents (Bischofshofen)
- 3 cases in a suburban part of Salzburg, which is dominated by housing from the post war time and are part of the urban fringe
- 3 cases in a rural context: one that is located in the centre of the village, and the other two that are dominated by single-family houses (Werfen, Golling and Neumarkt are located in the region of Salzburg).

Within the urban structure, there is one case that is located close to the historical centre, whereas the other three are more dominated by residential land use. The three suburban cases are located in housing districts which are organised in a functional neighbourhood.

In France, 26 cases were selected for this article. Their location is as follows:

- 2 cases in Paris *intra-muros*: Passage Jean Nicot, Square Ornano
- 9 cases in cities with more than 50,000 inhabitants: Boulogne Billancourt, Montreuil, Versailles, Aubervilliers (two cases), Saint-Maur-des-Fossés, Antony, Clichy, Le Blanc Mesnil
- 12 cases in towns of 5,000 to 50,000 inhabitants: Alfortville, Choisy-le-Roi, Tremblay, Châtenay-Malabry, Palaiseau, Cachan (two cases), Bois-Colombes, Fresnes, Montigny-lès-Cormeilles, Saint-Lys, Aire sur l'Adour
- 3 cases in rural areas: Port-Saint-Père, Baulon, Saulx-Marchais.



Table 1 Confinement rules in Austria, France and Poland in April and the first half of May 2020

	Border restrictions	Activity restrictions	Mobility and public transport restrictions	Sanitary restrictions	Restrictions on use of public space
Austria					
A	Borders closed on 11 ⁺ March for individuals who are not Austrian nationals or permanent residents. Entry permitted only with a medical certificate documenting a negative test for SARS-CoV-2 Borders open for goods	Educational, cultural, leisure and sport activities closed since 16th March Commercial activities limited to grocery shops, pharmacies, pet shops and drugstores Restaurants, bars and cafes were closed since 17th March, but allowed to offer only take-away food and drinks or home delivery	Interdiction of leaving the place of residence except for: (1) work, (2) supplying reasonable needs (shopping), (3) medical help, also for co-habitants or family members, help for relatives or (4) outdoor leisure/recreational use Long-distance trains since 16th March were offering only every second connection scheduled in the timetable Flights and international train connections suspended	Austrians or permanent residents had to quarantine themselves for 14 days when entering the country or testing positively for SARS-CoV-2 Since 1st April, shopping in supermarkets allowed only while wearing masks Partial restrictions on how many people are allowed in a shopping space (was not required by lockdown regulations)	Interdiction of public gatherings initially greater than 100 people and then limited to the number of persons living in the same household Social distancing of 1 m in public spaces (except for people living together) Closing of public parks (<i>Bun-desgärten</i>) since 16th March
		Since 14th April, smaller shops (max. 400 sq. m), hardware stores and craft businesses reopened Since 1st May, reopening of all shops, shopping centres and hairdressers		Since 1st April, compulsory to wear masks while shopping in general Since 14th April compulsory to wear masks in all shops and while using public transport	Opening of greater parks and gardens in Vienna and Innsbruck since 14th April
France					
F	Borders closed starting from 17th March for people, open for goods	Starting from 17th March, all activities stopped, except for vital retail (food, pharmacies, tobacco), and health services (limited to emergency) Gastronomy allowed to offer only take-away food	Interdiction of leaving the place of residence except for: (1) work, proved with a certificate from the employer, (2) supplying reasonable needs (shopping), (3) medical help, also for co-habitants or family members, help for relatives or (4) outdoor recreational activity if done for no longer than 1 h per day and within the radius of 1 km from the place of residence Special form filled before leaving home compulsory for all Minimal public transport service has been running only for the people who had to work. In some cities this transport was free of charge	Quarantine imposed on people who have tested positively for SARS-CoV-2 or have been in touch with infected people Unclear regulations (mandatory or not) about the face masks: at first they were not recommended and then promoted Providing disinfection means (gel etc.) at the entrance of shops became mandatory, but whether the use would be required was left to the shopkeeper	Interdiction of public gatherings Social distancing of 1 m in public spaces (exception for people living together) Closing of public parks, forests, waterfronts (physical marking of the forbidden places) Visible presence of the police in public spaces (collaboration between national and municipal police and army) Special regulations for people jogging in public spaces



Table 1 (continued)

Border restrictions	Activity restrictions	Mobility and public transport restrictions	Sanitary restrictions	Restrictions on use of public space
	From 6th April, some activities allowed to reopen, under the condition of keeping security measures (e.g. construction businesses)			
Poland				
PL	<p>Borders closed since 15th March for non-Polish citizens and/or employees (with some minor exceptions)</p> <p>The flow of goods ensured</p> <p>Educational, cultural, leisure and sport activities banned since 15th March</p> <p>Commercial activities limited to food shops, pharmacies, drug-stores and laundries</p> <p>Restaurants, bars and cafes were allowed to offer only take-away food and drinks or home delivery</p>	<p>Interdiction of leaving the place of residence except for: (1) work, (2) supplying reasonable needs (shopping, medical help), also for co-habitants or family members, help for relatives, (3) voluntary service helping with the fight against Covid-19, (4) participation in religious ceremonies</p> <p>The authorities were assuring the people that walking on every day physical/recreational activity (e.g. bike ride, jogging) is one of the “reasonable needs” although it has not been clearly defined in the regulations</p> <p>Limitations in the use of public transport: the number of passengers was not to exceed half of the number of seats and the distance of 1,5 m between passengers had to be kept</p> <p>Flights and international train connections suspended</p>	<p>A 14-day quarantine has become compulsory since 15th March for the Polish citizens returning to the country and people who tested positively for the virus. The fine for breaking the quarantine varied from 5.000 to 30.000 PLN (approx. 1125–6750 EUR)</p> <p>19 hospitals across the country (at least one in each province) were dedicated exclusively to patients infected with SARS-CoV-2</p>	<p>Interdiction of public gatherings (at the beginning for more than 50 people and then, since 25th March for more than 2 people except for religious celebrations which were allowed for no more than 5 people)</p> <p>Social distancing of 2 m in the public spaces (exception for the people living together)</p>



Table 1 (continued)

Border restrictions	Activity restrictions	Mobility and public transport restrictions	Sanitary restrictions	Restrictions on use of public space
	<p>Since 1st April wellness activities (hairdressers, beauty salons, etc.) and medical activities like rehabilitation, massages, etc. as well as hotels and tourist accommodation were banned</p> <p>DIY/building supermarkets were closed on weekends</p> <p>Since 1st April, new limitations on the use of still open commercial activities and post offices were introduced: only 3 persons per cash desk were allowed to enter the shop and only 2 per service point at the post office. Between 10 am and 12 p.m., only people older than 60 were allowed to enter the shops/service points</p> <p>In the manufacturing activities, the employers had to ensure that the 1,5 m distance between the employees can be maintained. In case this is not possible, the employees had to be equipped with facial masks</p> <p>New rules in the shops since 20th April: for shops smaller than 100 sq. m., the number of customers permitted in the shop at the same time is 4 times the number of the cash desks; for shops bigger than 100 sq. m the number of customers permitted is 1 per 15 sq. m of the shop</p> <p>New limitations in churches: 1 person per 15 sq. m of the building is permitted</p>	<p>Cities started to lower the frequency of public transport due to the sharply decreasing number of passengers using public transport. This was not required by lockdown regulations</p>	<p>Since 2nd April, shopping was allowed only while wearing sanitary gloves</p> <p>The quarantine also applied to those living in the same place of residence as the person being quarantined</p>	<p>Since 1st April until 20th April:— the public parks, boulevards, beaches and woods were closed (in urban areas it often has been physically marked using tapes or signs),</p> <p>- the use of public bikes was forbidden,</p> <p>- youngsters under the age of 18 were only allowed to be in a public space in the company of an adult</p>
		<p>Since 20th April, recreational activities in the public spaces were allowed officially</p>	<p>Since 16th April, wearing sanitary masks in public spaces and inside all the buildings except for private homes has become compulsory</p>	<p>Youngsters between the ages of 13 and 18 are only allowed to be in a public space in the company of an adult since 20th April</p>

Table 1 (continued)

Border restrictions	Activity restrictions	Mobility and public transport restrictions	Sanitary restrictions	Restrictions on use of public space
	<p>There were no restrictions for offices, public administration, and other businesses with no external clients, however, they typically transitioned to remote work and remained closed. For example, banks had limited opening hours for customers and were recommending that customers contact them by phone or use the Internet instead</p> <p>Health centres were trying to help patients as long as it was possible via phone consultation</p> <p>Public administration had very limited hours for the citizens and offered online help instead</p>			

For the present study, the reference used is the municipal population measured by the National Institute of Statistics and Economic Studies (INSEE).¹

The type of built environment of the observed places within urban areas was the following:

- 6 cases in the city centre: Passage Jean Nicot, Square Ornano, Boulogne Billancourt, Versailles, Saint-Maur-des-Fossés, Bois-Colombes
- 7 cases in multifamily housing areas: Aubervilliers 1, Antony, Clichy, Choisy-le-Roi, Tremblay, Cachan 1, Fresnes
- 6 cases in single-family residential areas: Le Blanc Mesnil, Palaiseau, Cachan 2, Montigny-lès-Cormeilles, Saint-Lys, Aire sur l'Adour
- 4 cases in mixed-use areas: Montreuil, Aubervilliers 2, Alfortville, Châtenay-Malabry.

While the vast majority of cases are located in the Ile-de-France region, western and south-western France are also represented: Brittany (1), Pays de la Loire (1), New Aquitaine (1), Occitania (1).

In Poland, the following cases have been examined:

- 15 cases in big cities or urban structures: 3City structure (Gdańsk-Sopot-Gdynia), Toruń and Olsztyn
- 6 cases in towns of 5.000 to almost 50.000 inhabitants (Węgorzewo, Malbork, Rumia, Brusy, Ustka, Sztum)
- 1 case in the suburban area (Pogórze, functional area of Gdynia)
 - which makes 22 cases located within urban structures;
- 10 cases in the rural areas, of which 5 were little hamlets with a population smaller than 400 residents (villages: Bielkówko, Dąbrówno, Męcikał and Wiele; hamlets: Janin, Jasień, Łązek, Niesiołowice and Okrągła Łąka).

Within urban areas, 3 observation points were located in the historic core of the city and 1 point was located in the historical urban structure next to the city centre where housing is a dominant land use. 11 observation points were located in the functional neighbourhoods, of which 6 points were in the form of prefabricated housing estates, 2 points

¹ The number of inhabitants is a complex criterion in France, due to the highly fragmented municipal division. The real meaning of this measure differs depending on whether a commune is isolated or part of a larger urban agglomeration. Hence, there is an ambiguity related to the concept of "peri-urban areas" (which were then included in the "urban" category). For example, in Ile-de-France, Saint-Maur-des-Fossés is a commune bounded by a loop of the Seine, while Clichy has no break in continuity with neighbouring communes. The needs of international comparison did not allow this aspect to be taken into account in the typology. It will nevertheless be mentioned in the conclusions.



were in new isolated multifamily housing developments (one of those was initially defined as suburban), 4 points were in single-family residential areas and 2 points were located in mixed-use structures where housing is only a minor land use.

Interestingly, the majority of the rural places were in very small hamlets which are normally only partly inhabited due to the presence of second homes in these places. Students engaged with the research were reporting an increased density in these “holiday” areas. All the places are located in northern Poland, typically within Pomeranian Province (Województwo Pomorskie) or neighbouring regions: Warmian-Masurian (Warmińsko-Mazurskie) or Kuyavian-Pomeranian (Kujawsko-Pomorskie) Provinces.

As mentioned earlier, we will also include our own observations which were made within the urban context and represent big European cities that differ in scale (Vienna, Reims, Wrocław).

The aggregated observations are presented in Table 2.

While reading the results of the study, it is important to bear in mind a few conditions.

First, the data are organised according to the framework defined in the previous section. However, we decided that, within the urban context, the observations which applied to all defined built environments (city centre, multifamily housing areas, single-family residential neighbourhoods, mixed-use areas) would be selected and presented in the first rows of the table.

Second, we present the observations which apply to all three of the analysed countries without any information about the country and using regular fonts. However, if the observations apply to a specific country, we indicate this by *italicising* the observation and identifying the country in brackets, i.e., (A, F, or PL). The observations written in **bold** fonts might have—in our opinion—stronger spatial consequences than others.

Third, in the case of rural areas, the scale of the “district” typically refers to the entire settlement, whereas the scale of the “neighbourhood” refers to the area adjacent to the plot.

Finally, in the case of France, where the regulations were stricter than in the other two countries, only the scales of the plot and eventually the neighbourhood were accessible for the students.

Discussion

The analysis of the reports produced by the students demonstrates a partial confirmation of the two initial hypotheses we assumed a priori. The first hypothesis was that the adaptation of the population to the restrictions will not be the same in different places due to (1) the economic and social characteristics of the residents, and (2) the morphology of the built-up environment and public spaces. The second hypothesis was

that the territorial behaviour of the population is likely to evolve over time. By comparing the effects of the restrictions at the urban and rural scale, common observations can be confirmed in general. However, in some cases, the observations were counter intuitive and needed to be interpreted. In general, the statements can be made for the objected fields of interest and can show the difference between the situation in an urban and rural environment.

To address these differences, we decided to focus our discussion on four themes that emerged from the analysis: (1) the question of use of public space and mobility patterns, (2) the issue of density, (3) the problem of human behaviour and essential facilities as well as quality of housing and finally (4) the relation with the environment.

The evaluation of the second hypothesis seems to be more challenging at the moment. Looking back at the development of the patterns of territorial behaviour since spring 2020, European citizens have gone through different stages of regulations and phases of adaptation to those regulations. At first, there was a great degree of uncertainty of the exact consequences and effects of the new coronavirus and the disease caused by the infection, as well as of the rules of behaviour that might be imposed. Surprisingly, the population in all three countries generally followed the rules during the first lockdown in spring 2020. Bearing in mind the experience of the summer 2020 when the restrictions of social distancing and wearing masks were relaxed and of the so-called “second wave” marking an increasing number of cases of Covid-19 in Europe in autumn 2020 when the weaker response of the societies to the restrictions was commonly observed, it is apparent that this question cannot be answered yet and is rather an issue which requires a longer period of observation. Thus, this suggests that our study might fit into a wider perspective and can contribute to a more general description of the evolution of the spatial behaviour during the entire time of the CoV-SARS-2 pandemic. Our study confirms a rather strict adaptation to the social distancing and confinement rules in the three analysed countries in the wake of the outbreak of the pandemic SARS-CoV-2 in spring 2020.

Usage of public space and the change of mobility patterns

The impact of the restrictions in all analysed countries was the most visible in the absence of movement in the public space. The pictures of the emptiness and quietness of street spaces, squares, and city centres were particularly impressive and spectacular. People often noticed birds singing in the dense urban areas. This was remarkable not only in urban but also in rural spaces and in all types of analysed spatial environments.



Table 2 Aggregated observations of the impact of confinement rules on territorial behaviour and space in three European countries on different scales

Built environment	Scale	Neighbourhood	District
Urban	Plot	<p>Containment is highly respected. Very few people are leaving for work. The majority of people are staying at home. There are cases of people who reportedly never left their homes for the entire period</p> <p>People spend more time than usual on their balcony, terrace, or courtyard (if these facilities are available)</p> <p>Many reports mention the paradoxical experience of noise: on the one hand, the quiet environment outside the buildings and on the other hand, disturbing sounds from the buildings (e.g. everyday life of the neighbours)</p> <p>New forms of sociability are observed: social solidarity on the local scale (e.g. messages left on the front door/information table in the building offering help to seniors with shopping and walking the dog) and “manifestations in public” (e.g. going out to the balcony in the evening to applaud the care staff at 8 pm)</p> <p><i>The higher share of people working from home is reported in bigger cities than in towns. (A, PL)</i></p> <p><i>Delivery activities are observed mainly in the morning (commercial vehicles), but remain few in number. (F)</i></p>	<p>At the beginning of the confinement time, the general mobility, including vehicle traffic, is extremely low. The quietest period is observed during the Easter holidays (Easter Sunday was on 12.04.2020)</p> <p>The functions of the public spaces are changing. In the absence of car traffic, pedestrians and cyclists occupy the street and pavements</p> <p>Public transport is underused due to the regulations (e.g., the number of passengers is limited to 50% of the seats), but also due to the fear of using it and no need for travelling. Public transport operates less frequently at the beginning of the confinement</p> <p>Rising usage of individual means of transport. There is a tendency to use cars as the preferred mode of transport over bikes</p> <p><i>After reopening parks and boulevards, people tend not to maintain the social distance properly in those places, although they generally maintain it in the streets, shops, etc. Typically, they keep distance while queuing (due to the presence of marks on the floor or pavement). After reopening the parks and boulevards, an increase in the number of pedestrians is observed. (A, PL)</i></p> <p><i>There is a significant increase in the operations of courier delivery services. (A, PL)</i></p> <p><i>Shopping hours for the elderly or people with special needs were introduced. (A, PL)</i></p> <p><i>There is an increase in the number of cyclists during the lockdown. (A)</i></p> <p><i>Mask regulations (when legally required) are not followed strictly (not wearing them all the time, wearing them incorrectly = not covering both nose and mouth). The students repeatedly report bikers breaking the mask rules (typically not wearing them at all). (PL)</i></p> <p><i>Due to the restriction of movement, the district could not be observed. Moreover, under these conditions, the very notion of district fades away. Finally, it is at the neighbourhood level that one finds—or does not find—the goods and services to satisfy the most basic needs. The district loses its significance. (F)</i></p>
		<p>At the beginning of the confinement, very limited external activity of the people (even if legally allowed) is observed. For example, shopping rather once or two times a week than every day</p> <p>Food shops and pharmacies generate queues that sometimes stretch far into the street (or into the parking lot for mini-markets). The number of people using them varies according to the time of day. The presence or absence of these shops is noted almost systematically and presented as an asset or a handicap by the students</p> <p>Closing of the playgrounds puts more pressure on other available spaces like streets, courtyards, etc., but also results in people staying more in the private garden if available</p> <p>People are using not only pavements but also carriage-ways to keep the distance and in doing so they redefine the meaning of the public space of the street</p> <p>The closure of a large number of shops, commercial and public services, parks and other green areas and recreational facilities considerably alters the functioning of the neighbourhood</p> <p>The neighbourhood scale becomes the preferred space that is accessible for daily outdoor activities (walking, running, etc.). Although it is not mandatory, it also becomes the space favoured for (alimentary) shopping. It is allowed to shop in large retail facilities, but people are afraid to go there probably because of the virus and the (potential) very large queues</p> <p><i>Pedestrians and joggers are mainly present in the afternoon. Many students report observing the same people throughout the study. This is linked to the confinement measures (movement limited to 1 km around the home), but perhaps also to the fact that many people stick to their own daily routine. (F)</i></p> <p><i>The maintenance of public spaces deteriorates (rubbish, anarchic vegetation). (F)</i></p> <p><i>People begin gardening in the “shared” neighbourhood spaces (e.g. in an open space between buildings). (PL)</i></p>	



Table 2 (continued)

Built environment	Scale	Neighbourhood	District
City centre	Plot	Neighbourhood	District
Multi-family housing areas	<p>Tourist apartments (short-term rental) are vacant</p> <p>Tenants (i.e. students, weekly workers) often leave rented flats and spend the confinement period somewhere else (probably in their family homes)</p> <p>There is a high level of differentiation according to the functions present in the block: very commercial or very tourist empty blocks (e.g. Passage Jean Nicot in Paris), mixed and densified residential blocks</p> <p>Many people work from home. At the beginning, they were clearly having some “free” days (e.g. sitting on their balconies, doing housework), but later on they started to work regularly from home. It was possible to see many people sitting at their computers inside</p> <p>New behaviour of the residents, trying not to meet in the common spaces of the building (staircases, lifts, halls, entrances), is observed</p> <p>Courier delivery shopping is visible in the shared space of the multifamily buildings (packages left in front of the doors)</p> <p><i>The exchange of residents has been reported in several cases. Some people (apparently renting flats) left, while others came to spend the confinement in the apartment. In one report, the observer mentioned “I met people I have never seen before in my building”, Gdańsk-Suchaninno). (PL)</i></p>	<p>There is a significant decrease in the density of the population in large cities. There are buildings, especially in the most attractive areas (i.e., Main Town in Gdańsk) where only one apartment is inhabited</p> <p>Car-park lots, including those located along the streets and covered car-parks are empty</p> <p><i>However, this phenomenon (empty car-parks) has not been observed in towns. (PL)</i></p> <p><i>There are numerous markings in the public space (information boards, signs and ribbons prohibiting the use of the premises, signposts, public or spontaneous messages of support for carers and other people who have stayed at work). (F, PL)</i></p> <p><i>In some cases, these markings are reportedly perceived as invasive and anxiety-provoking. (F)</i></p> <p><i>The majority of pedestrians are seniors. (PL)</i></p> <p>The operational mode of local gastronomic services changes by offering take-away food mostly for the residents of the district (“solidarity” flyers distributed throughout neighbourhoods are asking the residents to order food to allow local business survive the lockdown)</p> <p>All car-parks lots are full and in most cases the cars are not moved for several consecutive days</p> <p>People taking the car in the morning are typically the same people, which suggests that they are going to work regularly. There is a decrease in the use of cars during weekends, which suggests that they are used to going to work</p> <p>Experimental new food distribution is observed – “food trucks” coming to the neighbourhoods (e.g. bakery car) for a couple of hours. This did not remain after the confinement. (A, PL)</p> <p><i>Home delivery food service increases. (F)</i></p> <p><i>Spontaneous interactions between people have been observed – they started to engage in them more frequently in comparison to before the pandemic (e.g. Olszryn-Jaroty). (PL)</i></p> <p><i>Social and legal problems, including not respecting confinement regulations, have been observed in large social housing estates. Conversely, newer, often less dense, collective housing areas have not experienced such problems. (F)</i></p>	<p>Almost all services except for basic shopping facilities and pharmacies are closed. This gives the city centre the appearance of being “dead”</p> <p>Local shops are not very busy due to the small number of permanent residents</p> <p><i>The city centre remains very calm and quiet. Very few people come to the centre, unless there are recreational options (e.g. river-bank). The situation started to change (but not radically) only after the reopening of shopping malls (4th May, with some restrictions). (PL)</i></p> <p><i>Apart from shops, there are employees working in local infra-structural facilities (e.g., local heating plant) or taking care of the businesses (e.g. security in the bank), however they have no contact with external people. (PL)</i></p> <p>Empty open space sport facilities (pitches, tennis courts) including school sports facilities and playgrounds are observed</p> <p>School children are busy at home because of e-learning. They are not present very often in the public space</p> <p>Open spaces during the week are not very busy</p> <p>More bikes are observed during weekends and in the evening, which suggests their rather recreational use</p>



Table 2 (continued)

Built environment	Scale	Plot	Neighbourhood	District
Single-family residential neighbourhoods	In the cities not much changed, whereas in the towns there typically were people “returning home” like students	People talk to the neighbours (over the fence) while keeping the distance	The density within neighbourhoods increased in towns due to the arrival of adult children such as students. In the cities, there is no change <i>Mobility, already modest, was almost absent. Few vehicles and very few walkers other than dog owners were observed. There is little sociability between neighbours. (F)</i> <i>Mobility is based on cars even if the distances are walkable. (A)</i> <i>The children are reported to visit each other in their houses. (PL)</i>	Streets remain rather empty. People tend to leave their plot by only using the car Local facilities such as (typically busy) school sports facilities remain empty Local shops are not particularly busy
Mixed-use areas	<i>Very few people are observed due to non-housing land use remaining closed (hotels, offices, other businesses). (PL)</i>			
Rural	More activities are being done around the house such as gardening, crafting, or playing. Surely, the time frame when people were seen outside differs very much from the normal (thus not “confinement”) usage pattern Compared to the time before the confinement, the usage of cars rises, which could be explained by the attempt to reduce the contacts. Even leaving the plot is mostly done by car <i>Second homes are used more frequently. (F, PL)</i> <i>Gardens are frequently used, and sociability remains important. This is different to urban areas where the gardens remain quiet. (F)</i>		The density of the population increased. Many people came to spend confinement in their second homes – e.g. students returned home from their university cities Even if the available space is rather generous in the rural areas, people are keeping a bigger distance between them than it is required. The rules of social distancing remain generally respected <i>Very few people were leaving for work. The majority of people were staying at home. The only exception is found in a little village (Jasień) where almost half of the residents was still going to work (including nightshifts). (PL)</i> <i>One report underscores that small groups of youngsters gathered in the fields (while forests were forbidden). (F)</i>	Only essential services such as supermarkets are open. People are queuing to enter the shops to maintain distance <i>Local shops are becoming the only places of “social interaction”. In some cases, an increase in the number of customers is reported (e.g. Jasień by almost 40%). (PL)</i> <i>Even in extremely empty places (e.g. forests), people try to walk only in family groups. Visitors tend to break the regulations (e.g. entering the forest while forbidden, walking together in bigger groups, not wearing masks) more than the local people. (PL)</i> <i>In a few reports, a phenomenon is observed where people do not carefully follow the social distancing restrictions in public spaces. That is probably because the lack of habit of social distancing. For example, in cities and towns there are lines marked in the shops indicating how to keep 1,5 m distance, whereas this was not done in the countryside. (PL)</i>



Mobility as a whole was sharply dropping, which both in urban and rural areas was reflected in the little number of cars in the streets. However, this was not due to people not using this mode of transport. On the contrary, private vehicles were reported to be preferred when people needed to go somewhere. Especially in urban areas, where the dependency on public transport is generally higher, the awareness of the dangers of personal contact that can happen in bus, tram, or train (if available), even with new social distancing regulations, was quite common in all places (see also Bucsky 2020; Chatterthon 2020). In rural areas, where public transport is typically underdeveloped in comparison to urban areas, there were almost no means of transport other than private cars. The budget problems in almost all municipalities coupled with the changed mobility behaviour might unfortunately be a good excuse for decreasing the frequency and, as a consequence, the attractiveness of public transport in the future. In the long term, this experience and the development of the situation can have a negative impact on mobility patterns in the future (see also Barbarossa 2020; Batty 2020). On the other hand, the total amount of travel could drop because of the development of remote work, which was also observed by the students.

Interestingly enough, the attitude towards using bikes varied across countries. In Poland, no increase in bicycle mobility was noticed. Assuming that bikes are individual modes of transport which help in avoiding personal contact between people, this observation was surprising despite also being observed in Hungary (Bucsky 2020). We can only speculate that this situation was caused on the one hand by the fear of getting infected because the bike does not look as “protective” as a “closed” car, and on the other hand, because the majority of destinations (work, school, university, leisure) was not accessible and the recreational reasons were sometimes questioned by the authorities or restricted to a very small area such as in France. Furthermore, at some point in Poland, the areas normally used for biking, such as dykes, were seen as “boulevards/green areas” and hence considered “closed”. Thus, the use of bikes was not essential. Instead, people tended to walk more than usual because this was legally allowed everywhere and combined the reason for the outing (e.g. shopping) with physical activity. In Austria, however, the attitude towards cycling was different and the usage of bikes increased, especially for recreational activities in bigger cities. This seemed to be a consequence of avoiding the use of public transport. Bikes were used more frequently in Austria and Poland once the regulations were relaxed (e.g. opening parks, forests, boulevards). In the case of Poland, bikes were increasingly used for recreational purposes and not as a mode of transport for everyday activities (Fig. 2).

Social distancing regulations had two different consequences for the usage of public space. First, the street in

its whole width was used in order to maintain distance in both urban and rural environments. The space was needed because the typical pavement was not wide enough to ensure that sufficient distance from others could be kept. Second, if it was not organised, people did not have patterns of “distancing” behaviour in public spaces (Batty 2020). They easily kept the distance when it was somehow made evident (e.g. signs, floor markings)—for example, while queuing at shops or post offices. Around the entrance, shopkeepers typically marked the required distances. However, while walking, for example, they did not know how to pass people walking in the opposite direction. Only a few of them were leaving sufficient space by moving to the street or changing the sidewalk. We can only speculate that the reason for this behaviour lies perhaps in the lack of practice in this kind of situation rather than in the intention to not follow the regulations of social distancing. Closing the parks, playgrounds and boulevards generated more of this type of unintended meetings while passing other pedestrians in public spaces (Fig. 3).

Generally, we can demonstrate that closing public open and recreational spaces forced people in all three analysed countries to use streets and squares instead. These places were actually not prepared and in consequence not suitable for this purpose. Although the decrease in general mobility helped accommodate the increase of physical activity and recreation in the streets and squares, this should be carefully considered in the future when the question of closing open green spaces arises again. We have clearly learned that closing such spaces only brought unnecessary stress to people. In addition, it forced them to either use a public space not arranged for this purpose (streets, squares) or find a loophole and use a space which was not defined within the legal limitations (dykes, river valleys). The latter was not applicable to France due to the imposition of a 1 km travel restriction.

In rural areas, the use of public space generally did not change as much as in cities and towns. This of course happened because the availability of private open space is typically much higher, which ensured that people mostly stayed at home, including their gardens.

In any case, mobility has become more individualised, which can be explained by the combination of the regulations in force and the general fear to come too close to each other.

The evolution of mobility has been perceived differently by the students depending on the observation point. Those located on the edge of the neighbourhood were very sensitive to the reduction of road traffic on major arteries and the reduction of activity around public transit stations, in particular the metro/train or other more generally integrated stops of public transport, which are usually busy places. Students located in the heart of the block were very sensitive to the disappearance of usual internal traffic, for example,



Fig. 2 Closed local park,
Wrocław



children going to school or people crossing the block to get to the bus/tram/metro stop, as well as to the reorganisation of traffic and the occupation of public spaces.

Density

In general, the population density is typically much higher within the urban context than in rural areas; however, this changed during the first phase of the lockdown in some places. Although in Austria and Poland travelling within the country was not officially forbidden and the change of the place of residence during the time of confinement was actually possible, there was a shift in density between urban and rural areas. This also happened in France, where it was not allowed to change one's place of confinement. In anticipation, more than 1 million inhabitants of the region Ile-de-France escaped to other parts of France and fled to their holiday houses, parents and family, etc. Among the French students participating in the research, 20% reached out to such locations, providing cases in rural areas (e.g. Impasse du Castagnon, Aire sur l'Adour), or in the suburban parts of other French cities (e.g. Port-St-Père, Nantes).

In smaller cities and towns, the density in the centre typically remained more or less unchanged. This would suggest that they are used in a more sustainable way—they tend to serve their residents rather than only tourists and businesses. Typically, people work and live in the same place (city, town). On the contrary, it appears that in the centres of the bigger cities, where the density decreased, the relation

between place of residence and the place of other activities is not that clear. People stay there for their work or studies and especially for leisure purposes (tourism), but they use space in a different way. Another reason for fleeing from the centres of large cities could be the quality and equipment of housing. Because of the size and prices, the apartments, although wonderfully located, are in general smaller and often have no external facilities (balcony, terraces), which make the permanent stay more difficult in the long term.

Thus, the densities within urban areas of bigger cities have changed. Urban centres, which were known for busy working and leisure usage and attracted tourists before the outbreak of the pandemic, became visibly less dense. There were not many residents left. It was reported that students and tenants whose jobs were “suspended” typically left this area and short-term rentals stopped because of the lack of tourists. The reports from Poland show a significant number of elderly (apparently permanent residents) using the space (walking, going shopping) in cities that are popular with tourists such as Gdańsk.

In residential areas, on the contrary, the density increased. With the restriction on external mobility, balconies and terraces were broadly used and people were seen sitting at their windows. It was also reported that people established urban gardens in the shared spaces of the multifamily neighbourhoods. In single-family areas, people of course were using their private gardens.

A few reports observed an increase in domestic violence or/and number of arguments within households.



Fig. 3 A queue to the local bakery, Vienna



In all countries, the discussion in popular media pointed out that one outcome of this pandemic will be the end of reurbanisation due to the density of the cities contributing to problems which are absent in rural and suburban areas and creating a breeding ground for a higher infection rate. However, there is no clear evidence supporting the link between density and infection. On the contrary, Hamidi et al. (2020) demonstrate that connectivity matters more than density in the spread of Covid-19. Past experience shows that rural areas seemed to be affected the most by the 1918 influenza pandemic when comparing the mortality rate of rural areas and cities (Parmet and Rothstein 2018). There is, however, an issue in connectivity, which seems to be positively correlated with the number of infections (not with the infection rate) if the functional urban areas are taken into account (Hamidi et al. 2020). This, however, is because of the interrelation between suburbs and the centre, not because of the density as such. This would be a very good argument against the common belief that suburban location is safer than central.

Thus, our research supports the opinion that neither higher densities nor housing facilities are the source of the problem in transmission of the disease (and hence higher infection rate). Instead, this problem is attributed to the shortage or even lack of sufficient and high-quality open spaces which can be used by different groups. Hence, the quest of both urban planners and inhabitants for more public spaces, and especially green ones, seems to be intensified.

Essential facilities, quality of housing and human behaviour

In the face of the pandemic, the meaning and structure of the “essential facilities” has been re-defined. The pandemic proved the importance of local retail, especially grocery shops, and, above all, public open and green spaces. Within the social distancing regulations, sufficient space for walking has become crucial. While the danger of infection in department stores and big shopping malls was increasing, the local shopping streets and open markets provided not only more safety for the residents, but were also more friendly in introducing social distancing measures and offering a “supportive social environment” for the residents. There are suggestions (Gallun 2020; Sheth 2020) that pandemics could actually accelerate the decline of both department stores and, especially shopping malls, which has already been observed before the outbreak of this pandemic.

Closure of educational facilities (e.g. kindergartens, schools) significantly reduced accessibility to the general usable facilities such as courtyards and playgrounds. The institutions themselves were closed with some exceptions. With insufficient open green and recreational spaces, the pressure on the still available public space was increasing. Within the confinement restrictions, the closure of gardens, sport facilities and playgrounds further exacerbated this problem of reduction of publicly accessible space. Some reports from Poland mentioned an “illegal” (or at least without getting any permission) use of the university facilities



(green areas, sport facilities in the open air), which remained empty during the time of lockdown. Formally, university premises are not public spaces, but very often they are open and publicly accessible. People were using them for sport and recreation because there was no legal way to fine them for breaking the interdiction of using public green spaces. This experience signalises that there are actually quite vast areas not having any useful function for the society for quite long periods of time. This could apply especially to educational buildings which normally remain empty during holidays and weekends, but could easily be extended to many other facilities such as sport stadiums, hotels or offices. Thus, the quest and challenge for multi-use of buildings and corresponding spaces are returning to academic, professional and municipal discussion. This is fuelled not only by sustainability reasons (see, for example, Ansari et al. 2018) but also by the functionality and optimization of the use of urban spaces. The multi-use of buildings and places can easily be coupled with the question of temporary use of buildings and places (see, for example, Bishop and Williams 2012; Blumner 2006; Galdini 2020; Madanipour 2018) in the context of facilitating residents' life under lockdown restrictions.

These are important lessons for future urban design projects and generally for urban planning.

The questions on the location and spatial patterns of the “essential facilities”, both commercial and public, lie of course in the heart of the discussion on the quality and sustainability of neighbourhoods (e.g. Hamiduddin 2018; Rydin 2019). The city of short distances concept (Wegener 1994) emphasises mixed use in housing areas, with the special focus on the functions that can supply the majority of everyday needs of the residents and that can be accessed by walking or cycling. Complete functional neighbourhoods, equipped with local retail and service centres, were seen in the students' reports as privileged. First, because they helped to avoid journeys to other parts of the city. Second, because the process of shopping, thanks to their form and scale, has been facilitated. Finally, the process of shopping created a frame for relatively safe social interactions. It can be almost said that the pandemic contributed to the renaissance of the local shopping street and open market. On the contrary, homogeneous housing areas, especially suburban, were perceived as “incomplete”, not providing important functions. Thus, the pandemic made the quality of housing neighbourhoods more evident for their residents.

In France, some of the large social housing estates were experiencing serious, bigger than before pandemic (Clais 2016), social and security problems. They are often identified as a separate category in terms of public action, under the name of sensitive urban areas (*zone urbaine sensible*, ZUS) (Damon 2017; Gosselin 2015). Law enforcement agencies hardly venture into them and organised local gangs

dictate “their laws” (Gayet et al. 2020). Student reports from our research emphasise that during the lockdown, local businesses did not maintain themselves there, or did so only to a limited extent, and places of drug traffic were established there. In these territories, confinement has been much less respected than elsewhere. Areas with concentrations of illegal trade have changed location (e.g. Tremblay: from the foot of a building to the square where families are not allowed), but have not disappeared. Intended deterioration of the public space (e.g. garbage cans, lights) continued. Law enforcement has had little presence.

These kinds of phenomena have not been observed in Austria and Poland or in newer, often less dense, collective housing areas in France. On the contrary, in Poland, large housing estates were somehow privileged thanks to their complete functional structure and sufficient amount of green and open spaces. Elements perceived as favourable in these newer neighbourhoods in France and in Poland include green spaces, even inaccessible ones, and balconies and terraces in the dwellings (Fig. 4).

In all cases, the student reports insist on the quality of the housing (size, soundproofing, presence of balconies and terraces) as being perceived by both students and residents as an essential element.

In the context of very harsh confinement, individual habitat areas appeared to be privileged places. Student observation reports confirm this, with a strong emphasis on the lower density and the presence of greenery. Of course, they are all limited to their own experience. The reports did not mention the issue of housing quality (e.g. gardens shielded from the neighbours). Very modest use of the gardens can be explained by a lack of habit (small gardens with a more aesthetic than functional vocation), but also, and probably above all, by the fear of getting infected. This fear must have been especially high in France where many houses with closed shutters were observed in these neighbourhoods, while the inhabitants were present.

In the rural areas, contrary to the cities and towns, the gardens were very much used. The rules of social distancing remained generally respected but without mistrust and fear of one's neighbours, which seemed to be stronger in cities. This could be explained by the knowledge about the lifestyle of the neighbours. In rural areas, people were typically aware of the limited number of contacts between people, especially when they did not go outside for work.

This brief overview of the results of our study demonstrated that in case of the current pandemic (or any other pandemic in the future), the local facilities, such as shops and other everyday services, proved their advantages over the big shopping malls. Second, there shall be a special focus on the facilities in the fragile urban environment, including, for example, big housing estates in France. The residents shall have better accessibility to those facilities, even if



they are located in temporary objects. Third, multi-use and temporary use of buildings and areas could actually make the life of the residents more bearable and help in the fight against the disease, for example, if arranged as an open-air fitness area, a medical test station or places for quarantine or self-isolation.

Relations with the environment

Many reports mention a kind of “relief” on nature. Students staying in rural areas, especially when their location was close to the forests, emphasise the robustness of nature and was demonstrated by wild animals coming closer and closer to the rural areas. In urban areas, the lack of noise based on intensive traffic was highly appreciated. A few reports mention that in the cities the birds could be heard for the first time so intensively.

As in many other places across Europe, pollution also generally decreased (ESA 2020). Although in Poland, this drop was not as significant due to insufficient individual heating systems vastly used in especially rural areas.

From a social point of view, the importance of greenery in every form, especially in urban areas, has been emphasised.

Conclusions

Confrontation with the lockdown rules was (and locally still is) an extraordinary experience for millions of people across the world. In the European context, this experience is especially unique because there is no common memory of a pandemic, and the confinement rules are in deep collision with the lifestyle of European societies. In our study, we tried—in reaction to this unusual situation—to collect and interpret the evidence from three European countries to understand how these rules may affect space and human behaviour in space. This in turn would help us to suggest appropriate “crisis actions” and suitable recommendations for the future and also to see our own urban design and planning practices in a new perspective. The results, despite contributing to the knowledge in the fields of urban planning and design, architecture or landscape planning, go beyond only spatial and environmental sciences and emphasise the requirement of an interdisciplinary approach to planning, including medical sciences.

The experiences of the residents in the three analysed countries in spring 2020 were certainly specific on a local and on a national level. However, what they have in common is a new pattern of territorial behaviour based on social distancing rules and re-definition of the essential needs that have to be supplied no matter what is happening in the pandemic situation.

Despite the fact that the confinement rules have been relaxed in early summer 2020, they still have and very likely will have an influence on the spatial behaviour of people, and the restrictions might be re-introduced as the spread of the virus increases.² This is actually already happening on the local level. Looking critically back at the experience, we have already might actually contribute to better governance of the crisis in the future. For example, it has become evident in our study that closing parks and green open spaces was not a good decision in any of the analysed countries, and in the future, this would not be helpful in dealing with pandemics. These types of public spaces should remain open and accessible at all times, as they help to relieve congestion, especially in densely built-up areas.

There is also a lesson to be learnt about the crucial role of public space and the new characteristics of this kind of space, which is ensuring the implementation of social distancing rules. This has to be confronted with the predilection of using private cars and avoiding public transport. How attitudes towards public transport in the fear of infection can be changed is a big question for the future. On the other hand, using the car is not really an alternative, aside from ecological reasons: the more cars are used, the less public space in the streets is available. The results of our study suggest that using a bike is not always the first choice of people, even if this is both individual and, thus, safe and adaptive to the public space. Hence, in order to maintain distance by walking and to encourage bike usage, this means that there must be a reduction of the space which is reserved for the cars. Pop-up bike lanes, which are getting implemented in several European cities, are a first step, which can be seen as a result of this process. Even if it is claimed that this intervention is redundant, it could be a first attempt to change the mobility pattern in the city. We would like to emphasise that these pop-up cycle lanes are not a result of the pandemic, but they can be considered as a window of opportunity. Observations that emerged from the spatial organisation of social distancing rules contribute to the discussion on how we would deal with the division of urban land in the future. The social distance regulations in particular demonstrated how little space is allocated to pedestrians, and this applies also to cyclists. With regard to the situation during the pandemic, the importance of the question of the fair and just distribution of space will probably increase.

The other important role of public space is to help people to learn new patterns of territorial behaviour (e.g. distancing). Our point here is that urban design can deliver specific solutions that can help to develop these new habits, but new

² This actually happened in all analysed countries in October and/or November 2020 while this article has been in the process of publication.





Les
déchets
ménagers

Fig. 4 The degradation of public spaces on Campus Condorcet (Aubervilliers, Ile-de-France Region). Photo composition by Kahina Adballah

thinking about urban planning is needed too. For example, shopping streets are much more helpful in ensuring social distancing than large shopping malls under one roof.

Thus, for the future, there will be a central question about just division of the public space. Should it remain bigger for cars (street, car-park lots) and significantly smaller for people walking while the social distancing rules are in force or the split shall be re-defined? We learned that closing parks

and playgrounds in fact increased the density of people in the streets. By increasing the available space for pedestrians would help address this problem.

We have also learned a big lesson about facilities that are of first need and their location in urban and rural areas. There are firm arguments that big shopping centres are not able to help while the confinement rules are in force, and the importance of local retail and other services is undeniable.



This trend is also connected with the mobility patterns, which become more short distances, which encourages people to walk or bike. Certainly, this is not always possible because there are workers in essential services who need to get to work, but at least, this return to locality decreases the pressure on public transport. The crisis made the need to deal with flexible individual modes of transport at the local scale even more evident. A future issue will probably be the modal split between them and the design of the places dedicated to changing the mode of transport.

The pandemic brought the quality and equipment of housing into the centre of discussion again.

The quest of multi-use of many facilities, e.g. school gardens and sports grounds, has to be brought to the discussion. The temporary arrangements of urban areas in the context of helping with the pandemic require deeper insight too. This should be part of the adaptive strategy of each city.

We demonstrated that an urban environment plays an important role in policies aiming at preventing the transmission of infectious diseases. In addition, there are actually crucial elements of urban structure that must be provided. We did observe that at the beginning of the confinement, when people were willing to follow the rules strictly, the urban environment was not always prepared to facilitate this kind of behaviour. It can be, thus, assumed that there is a major challenge in adapting and rearranging an urban structure so that it may respond in a better way to the restrictions caused by the danger of epidemics.

We are well aware that our findings are only preliminary and much more can be learned both from the deeper insight into the data we have collected and from sharing cases from different countries.

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