

Social life and use of an Arctic city centre during the COVID-19 pandemic

David Chapman, Jennie Sjöholm, Sandra Zetterkvist & Agneta Larsson

From March 2020, regulations and recommendations were implemented in Sweden to reduce the spread of COVID-19, which included limitations to public life. Overall, these sought to reduce activities that brought people together and in so doing, transitioned the relationship between cities and people into a new paradigm.

The study explores public usage of an Arctic city during the pandemic to understand how COVID-19 altered people's 'social life'. Data was collected in the Arctic city of Luleå, by structured questionnaires and semi-structured interviews. These indicate that: 1) a significant reduction in city visits, 2) multi-faceted city visits were reduced to single task based visits, 3) a significant reduction in leisure based activities, 4) an increase in digitalization of work, retail and leisure activities, 5) perceptions of responsibility, guilt, boredom and minimizing social networks were reported, and 6) post-pandemic, people questioned the ability of cities to bounce back.

The survey and interviews show that in the Arctic city of Luleå, restrictions put in place to reduce spread of the infection had a significant impact on public life and use of the public realm, which is in accordance with research from outside the Arctic.

The conclusion is that in the short term, the role of urban centres in daily life was reduced and the role of digitalisation for work, goods and services was rapidly advanced. However, the research also shows that the 'social dimension' of Arctic cities - to see other people and take part of civic life on site - was not easy to replace and is valued by the community.

David Chapman, Associate Professor in City & Regional Planning, University of Stavanger; Jennie Sjöholm, Senior lecturer in Urban Design & Conservation, Luleå University of Technology; Sandra Zetterkvist M.Sc; Agneta Larsson, Associate Professor at the Department of health, medicine and rehabilitation, Luleå University of Technology.

Introduction

Attractive urban centres and cities are a fundamental objective of good design and planning (Hidman, 2018) and the last decades have seen a sustained focus on improving cities, settlements and urban areas (Carmona, 2021) to facilitate urban life.

Since 2020, the role of cities was challenged by a form of coronavirus, which is commonly named COVID-19. Initially found in Wuhan, China (WHO, 2020), the virus spread rapidly with the first case of COVID-19 in Sweden confirmed on 31 January 2020 (Public Health Agency, 2020). By March 11, 2020, the World Health Organisation (WHO) classified COVID-19 as a pandemic (WHO, 2020). To reduce the spread of COVID-19, recommendations were introduced by the Swedish Government (Folkhälsomyndigheten, 2021). Overall, these sought to reduce activities that brought people together and in so doing, transitioned the relationship between cities and people into a new paradigm.

To deepen the knowledge of COVID-19 in Swedish Arctic cities, research addressed in this article explores how peoples' 'social life' in the public spaces of these communities changed with COVID-19 recommendations. The study was carried out spring 2021, during the third wave of increasing infections, which in turn followed directly on the second wave, with high infection rates throughout the winter and spring season 2020-2021.

COVID-19 restrictions in Sweden

In Sweden, regulating responsibilities for communicable diseases like COVID-19, is legislated by the Communicable Diseases Act (SFS 2004:168). According to the Act, everyone has an individual responsibility to prevent spread of the infection and is obliged to take reasonable precautions in order to do so. The Public Health Agency of Sweden (PHAS) issues recommendations of how to make these precautions. The regions can in turn issue guidelines, adapted to the regional situation. The government can decide on restrictions, which need to be adapted to the constitution. Table 1 lists various recommendations, guidelines, and restrictions that were implemented in Sweden during the pandemic.

Table 1: General and regional guidelines and recommendations due to the COVID-19 pandemic, affecting public life and the public realm. Based on information at www.krisinformation.se and www.norrbotten.se.

Date	Infection control measures
1 February 2020	The Swedish Government classifies the corona virus as dangerous for society according to the Communicable Diseases Act.
12 March 2020	Maximum 500 persons allowed at public gatherings and public events.
16 March 2020	PHAS requests persons older than 70 to drastically limit all contacts with others, including avoiding public transport, shops, public facilities etc.
17 March 2020	PHAS recommends employers to allow those who could work from home to do so.
17 March 2020	PHAS recommends all upper secondary schools, adult education, and universities to shift to distance teaching.
19 March 2020	PHAS recommends all unnecessary domestic travel to be avoided.
25 March 2020	PHAS regulates that crowding is not allowed in queues, at tables, buffets, or bar counters at restaurants, bars or cafés.
29 March 2020	Maximum 50 persons allowed at public gatherings and public events.
1 April 2020	General guidelines by PHAS says that: <ul style="list-style-type: none"> • People older than 70 and other risk groups should limit all physical contacts and avoid public transport, shopping etc. • The number of people on public transport vehicles should be limited, and services adapted to avoid crowding. • Employers have a responsibility to make sure distance is kept between both employees and visitors.

	<ul style="list-style-type: none"> • Shops and shopping malls should limit the number of customers at the same time in the facilities, and make sure there is distance between customers.
1 November 2020	The government allows sitting audiences at culture and sport events to maximum 300 persons.
3 November 2020	PHAS changes the regulations and general guidelines, for restaurants, bars and cafés, to allow maximum 8 persons at a table, and have at least one metre between tables.
10 November 2020	<p>The Norrbotten Region introduces regional guidelines that says:</p> <ul style="list-style-type: none"> • Refrain contacts with everyone except those you live with, including all social activities. • Refrain visiting all indoor places such as shops, shopping malls, museums, libraries, public baths and gyms. • Refrain from meetings, concerts, performances, sport practice and competitions. • Refrain from all unnecessary travel within or outside the region.
20 November 2020	The parliament prohibits serving of alcohol after 10 pm.
24 November 2020	Maximum 8 persons allowed at public gatherings and public events.
7 December 2020	PHAS recommends all upper secondary schools to partly close and shift to distance teaching.
23 December 2020	PHAS recommends use of facemasks in public transport.
24 December 2020	<p>The government strengthens restrictions, including:</p> <ul style="list-style-type: none"> • Maximum 4 persons are allowed at the same table at restaurants. • Serving of alcohol is not allowed after 8 pm. • The number of persons allowed at shops, shopping malls, gyms etc. at the same time is restricted based on the size of the facilities. • Christmas sales should be refrained. • Everyone who can must work from home, both in public and private. • All non-essential public facilities, such as baths and museums, should be closed.
10 January 2021	The government regulates that shops, shopping malls, gym and baths must limit the number of visitors to one per square metre.
9 March 2021	Strengthened restrictions of the number of people allowed in shops, baths, gyms etc., and customers and visitors should come by themselves, without company.
25 March 2021	Strengthened restrictions of the number of people allowed at museums, art galleries, amusement parks, zoos etc., and crowding must be minimized.
28 May 2021 – 14 June 2021	The Norrbotten Region introduced strengthened regional guidelines and restrictions emphasising the need to keep the distance to others, avoid all new contacts, avoid crowding, avoid all unnecessary travel within and outside the region, work from home etc.
1 June 2021	The first of five steps in gradually easing restrictions and general guidelines is introduced, including allowing more people at public gatherings and events, and allowing restaurants, bars, and cafés to be open until 10:30 pm.

In March 2020, measures to prevent the spread of COVID-19 began to be implemented. The PHAS requested persons older than 70 to drastically limit all contacts with others, including staying away from public transport, shops etc. They also recommended that all who could work from home should be allowed to do so, and that all upper secondary schools, adult education centres, and universities should shift to distance teaching. The guidelines further stipulated that no crowding was allowed at restaurants, bars or cafés, and the number of people allowed at public gatherings was limited. In April 2020, new guidelines stipulated that the number of people taking public transport and visiting shops and malls should be restricted to avoid crowding.

During autumn 2020, further limitations were made. E.g., in November 2020, PHAS changed the regulations and general guidelines, only allowing sitting customers at restaurants, bars and cafés, with a maximum of eight persons at a table, and with a distance between tables. During the autumn, many regions implemented regional guidelines, and in November 2020 Norrbotten Region strengthened the guidelines so that all contacts with other than the ones you lived with should be avoided. This included avoiding visiting places such as shops, museums, libraries, public baths and gyms, as well as abstaining from all unnecessary travel within or outside the region.

During spring 2021, further restrictions were put in place. In February 2021, all restaurants, bars and cafés were only allowed to be open until 20:30, and unless they had a separate entrance, only

one person per table was allowed in eating areas in shopping malls etc. In March 2021, further restrictions of the number of people allowed in shops, gyms, museums, amusement parks etc. were introduced, and people were asked to shop by themselves, without company. In May 2021, until mid-June, Norrbotten Region again introduced strengthened regional guidelines and restrictions emphasising the need to keep the distance to others, avoid all new contacts etc. (Region Norrbotten, 2021).

Starting in June 2021, restrictions and guidelines gradually started to ease, as the decision to classify the coronavirus as dangerous for society was revoked.

Sweden has been considered to have had softer restrictions compared to other countries. E.g. schools remained open to a larger extent, and facemasks were not mandatory at public places as you were supposed to stay at home when feeling ill. Overall, the Swedish population obeyed the recommendations, guidelines, and restrictions (Pashakhanlou 2022).

Public space of the Arctic city

Public space has long been a focus for social life, movement and gathering (Carmona, 2021; Larsson & Chapman, 2020; Sjöholm & Hidman, 2020) and urban design has focused the last decades on re-urbanising urban cores as densely populated centres for work and life (Batty, 2020; Frey, 1999). This has been argued as a way to offer more sustainable patterns of living (reducing resource consumption and pollution) with increased levels of attractiveness to people (socially, culturally, economically) (Campbell & Cowan, 2002; Jenks, Burton & Williams, 1996; Urban Task Force, 1999). This type of approach to 'urbanization' has been adopted across nations, including in the European Arctic (Nyseth, 2017; Tunström et al, 2018).

Like elsewhere, this prioritisation of Arctic urban centres as places for people is always under challenge. For many decades the car and the easy movements it facilitates also promoted dispersed activities, such as peripheral residential areas and shopping (Newman, & Kenworthy, 1989). Equally, today digitalisation is opening up new ways of out-of-town consumption with online shopping (Satish et al, 2021) and alternative ways of interacting and social gathering with reduced physical contact (Gehl, 2011).

Here the traditional role of city centres, as a place for people's daily chores, such as trade (Olsson, 2000) is diminishing in importance by the development of society (Carmona, 2021). However, while some reasons for visiting city centres may have diminished, the primary 'social role' for public space has remained of great importance (Mehta, 2013). City centres and their restaurants, bars, and public spaces are today's courts where people go to see, be seen and be part of public life (Sudjic, 1992).

Here the social life of public places is part a sceptical of society. Medieval times saw the notion of 'theatrum mundi', the idea of human society as theatre, while Shakespeare described the world as a stage and us as actors (1975). At a basic level, people playing a part in public space leads people to being seen, seeing others and in a way, is a complement to contact in private life (Olsson, 2000). However, relationships in public places are non-binding and can be a gateway for deeper contact between people (Gehl, 2011). They offer individuals an opportunity to shape their identity and enable an understanding of relationships and actions between people and places (Olsson, 2000). They can also act as resources of information about society and individuals and ways of behaviour (Gehl, 2011; Wallentin, 2007). Here, the social life in public places can be a source of inspiration, for individuals and society in the form of knowledge and needs (Carmona 2021; Gehl, 2011).

For Arctic settlements such as Luleå, seasonal climate variation can be a major enabler and barrier to public space usage. Temperatures can reach highs of +30 °C in the summer and lows of -30 °C in the winter, while the sea is frozen for around 6-7 months per year (Chapman, 2018). In summer the city's green and public spaces are destinations for social life & public gathering, and in winter new ephemeral public spaces, such as Luleå's 'Ice Road', are created by the winter covers of ice

and snow (Larsson & Chapman, 2020; Chapman, 2021). These new temporary spaces become destinations promenading, skating, and gathering, and present additions to the public realm network that are created by nature; a feature uncommon in settlements outside the Arctic. Winter conditions, however, do make public space usage a challenge. Studies in Finland show people spend only 4% of their total time outdoors in winter (Mäkinen et al. 2006) and winter-related decreases in outdoor activity are common (Chan & Ryan, 2009).

While the importance of public space has varied over time, it has always related to the social life of society and norms at a given point. People's social lives affect places, and at the same time places affect people's social lives. This means they are interdependent (Carmona, 2021) and are altered by events such as a pandemic (Frank, 2020).

In 2020 and 2021 use of public space and interdependencies were changed by the measures taken to reduce the spread of COVID-19 (Batty, 2020; Honey-Rosés et al, 2020). These kind of measures changed person's roles and appropriate behaviours in the city (Sennett, 1977) and (in Sweden) required self-regulated and reduced use of the city, in stark contrast to the ideas of the compact city (Alraouf, 2021; Breheny, M. 1997).

The aim of this research was to gain insight into people's behaviour and perception, and on the impact on shops, restaurants and cafés, and cultural life in an Arctic city centre during the COVID-19 pandemic in early spring of 2021. Moreover, it reflects on how this knowledge can be used to make places more resilient to pandemics. The research questions addressed included: How did pandemic restrictions affect urban social life in a Swedish Arctic city? Is it possible to protect public safety while also ensuring a strong civic social life that maintains human connections?

Method

Study design

This study was conducted as a case study, an approach to a question with the aim of explaining and understanding a case in its context (Johansson, 2002). This approach to case studies is explanatory and involves studying new problems without variable limitations, with the aim of shedding light on what is important. Case studies are important in that the reader who takes part in the case study can apply it to parts of their own context. Quantitative data and qualitative data were collected in parallel in March 2021, and used for answering the aim of the study. The focus was on what effects the pandemic has had on citizens' perceptions and behaviours; on shops, restaurants and cafés; and the cultural life in an Arctic city centre.

Survey

The survey was open to the public to answer between 2nd March 2021 and 2nd April 2021. During March 2021, the average temperature in Luleå was -2.4 °C. The average high in March in Luleå is -0.1 °C and the low is -14.3 °C (SMHI, 2023). The purpose of the survey was to obtain quantitative data about how people's usage of the Luleå city centre changed during COVID-19 and their prospects on how the city centre and their own behaviours would be different when the pandemic ends. The questionnaire had explanatory text introducing the purpose and goals of the research including a map of the study area. In four sections, the survey was used to gather:

- General information. This question set had closed answer alternatives and concerned age, gender, and occupation.
- Habits before the pandemic related to the frequency and main and secondary reasons for visits to the city centre and usage of facilities there. Frequency was rated on 6-point scales ranging from 1 (never) to 6 (daily). The question on reason had closed response alternatives and one open ended free response item.
- Habits during the pandemic. With a similar structure to the previous section, questions were concerned with understanding the use of the city centre during the pandemic.

- Your social life and future situation. This section of the survey gave respondents the opportunity to reflect on their use of the city centre during and after the pandemic. This question set was open and three questions asked:
 - What changes did you make during the pandemic?
 - Do you think these changes will last after the pandemic?
 - What are your further reflections on how the pandemic has affected your social life and behaviour related to usage of the city centre?

With a snowball sampling strategy, starting with networks with a geographically close proximity to Luleå, the survey was shared with the public digitally to reach as wide a response group as possible. Forums used were Facebook, LinkedIn and email. Those who received the survey were encouraged to share it with their contacts, which resulted in further dissemination.

Interviews

Semi-structured individual interviews were undertaken between 9th March 2021 and 9th April 2021, via digital communication with eight representatives from the public and private sector. The respondents, four men and four women, were strategically selected to represent the retail trade (3 respondents), restaurants (3 respondents) and culture (2 respondents). Open ended questions related to the following topic: How did the pandemic impact on social life in the centre of Luleå, and especially in the especially the trade, restaurants, and culture sectors? The respondents talked freely about the topic for about one hour; the interview data were recorded using video recording at Zoom then transcribed and analysed.

Data analysis

Firstly, the characteristics of the respondents and the frequency of visits and main reasons for visiting the centre were summarized using frequencies, percentages, and median values.

Secondly, a sub-analysis was performed considering potential differences between men and women, respondents that were students or working, and of different age groups. Due to a limited sample size, non-parametric statistical methods were applied: the Mann-Whitney U Test to analyse differences in time and the Wilcoxon Signed Ranks Test for sub-group differences. The software SPSS version 27.0 was used, with a statistical significance of $p < 0.05$.

Thirdly, the survey questions with open answer alternatives were analysed to find recurring tendencies in how the respondents' lives and use of public places had changed during the pandemic.

Qualitative data from the interviews with public and private actors was analysed in the following steps: (1) identification of meaningful units in relation to the research question, (2) categorization of the meaningful units, (3) description of the units' content.

Results

The case study location was the centre of Luleå, a city located by the coast in northernmost Sweden. It is the administrative centre of the Norrbotten Region, housing institutions such as the County Museum of Norrbotten, the Norrbotten Music, and the Norrbotten Theatre. These are all situated in the city centre, together with other cultural institutions such as Luleå's Cultural House (housing concert halls, conference facilities, an art gallery, and the main city library), Ebeneser cultural centre, and the stage Lillan. There are also two movie theatres, and a couple of art galleries.

The municipality of Luleå has about 78,500 inhabitants, of which 49,100 live in the city, and 9700 in the city centre (Luleå Council, 2020). Luleå has net commuting of about 12%. The municipality's upper secondary school with roughly 2400 pupils is located within the city centre, as well as both public and private workplaces with about 13,400 persons working during daytime and 5.000 during night-time (Luleå Council 2021). Luleå University of Technology, with a total of 17,670 students

including distance teaching, has its main campus at Porsön in Luleå, where many of the students also live.

The city centre is located at a peninsula, with average walking distance to major neighbourhoods: Örnäset around 2 km; Skurholmen and Kronan roughly 2.5 km; Mjölkudden, Svartöboden and Bergnäset around 3 km; Porsön and Björkskatan around 4 km; Hertsön roughly 5 km. A hub for the local bus network is in the very city centre, including a bus transfer to the Luleå Airport. There is also a bus station for regional busses, and a train station.

Being the biggest city in the region, Luleå is also a centre for trade and commerce. Over 300 shops, cafés and restaurants (including three shopping malls) are located in the city centre, the majority along the main street Storgatan. Luleå also has two other commercial centres, especially Storheden but also Notviksstan, which are competing with the city centre as they provide an increasing number of shops and are more accessible by car.

Survey Results

Characteristics of the respondents and frequency of visits to the city centre

120 citizens responded to the survey. Age distribution was uneven with 54% of respondents between the age of 20 and 29 years old. Gender distribution was 57% women and 42% men; 40% of the respondents were students and 58% were employed (Table 1). Of the whole group of respondents, 20% worked in the city centre and 14% had their home in the city centre.

The respondents significantly reduced their frequency of visiting the centre and its facilities for trade, restaurants, or culture during the pandemic in comparison to what they did before. From an average of visiting the centre on several occasions per month, visits were now reduced to once a month. They also less frequently used the facilities in the centre (Table 2).

Table 2: Characteristics of the respondents and subgroups occupation and sex, the frequency of visits to the city centre and facilities.

	All respondents n=120	Female n=68	Male n=51	Working n= 70	Studying n=48	p1	p2
Sex (female/male/other) n (%)	68(57)/51(42)/8	68(100)/0/0	0/51(100)/0	36(51)/33(47)/1(2)	65/35/0		
Age groups (20-29/30-39/40-59 />60 years) n (%)	65(54)/27(22)/22(18)/6(5)	39(57)/17(25)/11(16)/1(2)	25(49)/10(20)/11(22)/5(10)	17(24)/27(39)/21(30)/5(7)	100/0/0/0		
Occupation (working/studying/unemployed/pension) n (%)	70(58)/48(40)/1(8)/1(8)	36(53)/31(46)/1(0)/0	33(65)/17(33)/0/1(2)	70(100)/0/0/0	0/100/0/0		
Before the pandemic							
Visits to Centrum, Md (min-max)	4 (1-6)	4 (2-6)	4 (1-6)	4.5 (1-6)	4 (1-6)	.444	.003
Use of services, Md (min-max)	4 (2-5)	4 (1-6)	4 (2-5)	4 (2-5)	4 (2-5)	.565	.386
During the pandemic							
Visits to Centrum, Md (min-max)	3 (1-6)	3 (1-6)	3 (1-6)	3 (1-6)	3 (1-6)	.768	.989
Use of services, Md (min-max)	2 (1-6)	2 (1-6)	2 (1-5)	2 (1-6)	3 (1-6)	.837	.355
p3	.001	.001	.001	.001	.001		
p4	.001	.001	.001	.001	.001		
Scale: 1=never, 2= < once/month, 3= once/month, 4= several/month, 5= several/week, 6=daily visits							
p-values: Comparison of scores between the groups females or males (p1) and those working or studying (p2), using the Wilcoxon Signed Ranks Test							
Comparison of scores before and after the pandemic on visits to the centrum (p3) and use of services (p4) using the Mann-Whitney U Test.							

Despite great intra-group variation, a shift towards fewer visits were clear amongst most of the respondents. Before the pandemic, 22% stated that they were daily visitors to the city centre, 17%

visited several times per week, and 45% of respondents visited the city centre several times a month. 8% visited the centre less than once a month, and 2% never visited.

In contrast, during the pandemic, 36% of respondents stated that they visited the city centre less than once a month during the pandemic and 7% never visited the centre. Yet, 12% of respondents were daily visitors, and 5% visited the city centre several times a week.

This trend corresponds with less frequency of using the facilities in the centre. Before the pandemic, 11% of respondents stated that they used retail trade, restaurants, and cafés as well as culture facilities less than once a month, while during the pandemic a majority, 52%, of the respondents used these services less than once a month (38%) or never (14%).

Commonalities and differences between respondents that are female versus male, student versus worker, and of different age groups

Tables 2 and 3 show how the different sub-groups reported their use of the city centre and facilities before and during the pandemic. The results show that all sub-groups reduced the frequency of visiting the centre and its facilities for trade, restaurants, and culture. The reduction was significant for all groups except for the oldest age group.

There were great intra-group variations in the frequency of visits to the city centre and its facilities. The only significant difference between sub-groups was that the students before the pandemic less frequently visited the city centre than those who were working. Correspondingly, the sub-group of 20–29-year-old respondents (of which 74% were students) visited the centre significantly less (on several occasions per month) than the other age groups did. All age groups above the youngest on average visited the centre several times per week. This significant difference in visits was already visible when comparing the youngest to the respondents in ages 30–39.

During the pandemic, all sub-groups reduced their visits, however, the age group of 40–59-year-old respondents, on average, had the relatively highest frequency of visits; several per month. This was significantly higher in comparison to the responders just below them in age, the 30–39-year-olds (Table 3).

Table 3: Characteristics of the subgroups based of age groups, the frequency of visits to the city centre and facilities.

	Age group 20-29 n=65	Age group 30-39 n=27	Age group 40-59 n=22	Age group > 60 n=6	p1	p2	p3	p4
Sex (female/male/other) n (%)	39(60)/25(38) /1(2)	17(63)/10(37) /0	11(50)/11(50) /0	1(17)/5(83)/0				
Age (20-29/30-39/40-59 />60 year) n (%)	65(100)/0/0/0	0/27(100)/0/0	0/0/22(100)/0	0/0/0/6(100)				
Occupation (working/studying/ unemployed/pensio n) n (%)	17(26)/48(74) /0/0/0	27(100)/0/0/0	21(96)/0/1(4) /0	5(83)/0/0/1(17)				
Before the pandemic								
Visits to Centre, Md (min-max)	4 (1-6)	5 (3-6)	5 (2-6)	5 (4-6)	.001	.006	.619	.892
Use of services, Md, (min-max)	4 (2-5)	4 (2-5)	4 (2-5)	4 (2-5)	.394	.925	.381	.764
During the pandemic								
Visits to Centre, Md, (min-max)	3 (1-6)	3 (1-6)	4 (1-6)	2.5 (2-6)	.350	.908	.102	.604
Use of services, Md, (min-max)	2 (1-6)	2 (1-6)	3 (1-5)	2.5 (2-5)	.902	.433	.151	1.00

p5	.001	.001	.002	.063				
p6	.001	.001	.003	.109				
Scale: 1=never, 2= < once/month, 3= once/month, 4= several/month, 5= several/week, 6=daily visits p-values: Comparison of scores between the youngest age group and the other age groups combined (p1) and also the other groups versus another such as age group 1 versus 2 (p2), age group 2 versus 3 (p3), and age group 3 versus 4 (p4), using the Wilcoxon Signed Ranks Test Comparison of scores before and after the pandemic on visits to the centrum (p5) and use of services (p6) using the Mann-Whitney U Test.								

Reasons for visiting the city centre

Before the pandemic, the main reasons for visits were shopping (44%), work (20%), and going to restaurants and cafés (18%). 2% percent of respondents stated that cultural activities were their main reason for visiting. 14% were living in the area. In addition, 2% of the respondents chose the option to share other reasons for visiting the centre.

During the pandemic, 4% had no motive to go to the centre at all and an increase in other health-related reasons for visits was reported (8%). Reasons included pharmacy visits, doctor visits, eye examinations, training, and a change of environment and use of outdoor space (such as the ice road), etc. (Table 4).

As a supplement, respondents reported their use of retail areas, restaurants, cafés, and cultural offers as add-ons to their primary reason for visiting the city centre. 77 % of the respondents stated that they used restaurants and cafés in combination as a main reason to visit the city centre. 46% stated that they used trade and 45% culture in combination with the main reason.

During the pandemic, only 60% used any additional facilities at all. Shopping was limited the least, while about one-third of the respondents reduced their visits to restaurants (reduced to 38%). The main drop was cultural events that were very limited (reduction to 2%) (Table 4).

Table 4: Main and secondary reasons for visiting the city centre

	Before n (%) n=120	During n (%) n=120
Main reason ¹		
Work	24 (20)	19 (16)
Living in the area	17 (14)	16 (13)
Shopping	53 (44)	55 (46)
Restaurants and cafés	21 (18)	13 (11)
Culture events	2 (2)	2 (2)
Other: Health reasons	3 (2)	9 (8)
None	0 (0)	6 (4)
Secondary reasons ²		
Shopping	55 (46)	37 (31)
Restaurants and cafés	92 (77)	45 (38)
Culture events	54 (45)	3 (2)
None	5 (4)	48 (40)
¹ Single choice question, free answer option		
² Multiple choice question		

Reflections on social life and future situation

The final, free-response questions yielded a range of results. Respondents commonly highlighted that they had adopted 'working and studying from home'. They were avoiding 'public transport' and 'busier places' such as the city centre, shopping malls, and cultural facilities. Equally, respondents said that they avoided activities such as 'strolling in town and window-shopping', visits were also at 'less crowded times' and keeping 'distance' from others when in central areas was seen as important. For most, urban visits were for 'emergencies' and these were kept to as 'short a time

as possible', and they tried to effectively gather priority errands into a single visit. Some had to a higher extent than before aimed to support local businesses.

The void created by recommendations were seen to be replaced by home-based activity. While respondents highlighted increased home cooking, a great emphasis was placed on digital activities, including on-line shopping (necessary and optional goods and especially take-away), on-line entertainment (programmes/movies, gaming, cinema) and virtual social gathering. While the night-time economy (pubs, restaurants & bars) remained open, few respondents continued to frequent these establishments.

The respondents shared a common view that after the pandemic, things would inevitably not go fully back to how they were before. They thought that some behaviour changes and priorities made during the pandemic were beneficial and would continue. Being more goal focused, saving time and money and changed travel patterns were perceived as positive outcomes. So were adopting new habits of more active outdoor life, using the ice road and parks, and walking to destinations. Keeping distance and avoiding crowds and public transport would continue.

Online shopping and pre-ordering groceries or meals to be collected were highly valued by the respondents. However, they perceived that the expansion of such choices/options had already begun before the pandemic and therefore was inevitable. Also, many had a positive belief that more work, meetings, and lectures would be achieved digitally from home.

What respondents were mainly missing was the social dimension of meeting up with friends at pubs, restaurants or cafes, strolling and shopping, open preschool, public baths, gyms, library, etc.; to see other people and take part of civic life on site. They hoped that there would be options to do so again after the pandemic but were not sure. The current closures of facilities in the centre were worrying. The value of having a central meeting point was highlighted: *'I've understood the importance of there being a city centre, I did take it for granted before'*. The outdoor space in the centre needs to be attractive enough to be perceived pleasant to stroll through.

Respondents reported feelings of loneliness, boredom with the situation, being more goal focused, having increased responsibility, and feelings of guilt. Some experienced decreased social networks. These additional comments were mainly made by the youngest age group.

Interviews

Semi-structured interviews with representatives from the public and private sector revealed a range of outcomes. The interviews with Luleå City Council and Norrbotten Region highlighted major impacts on the cultural sector. Recommendations to close public facilities and/or restrictions on the number of people meant all but the city library and the public art gallery closed. The city library however limited its services to short visits for lending or returning books, printing etc. Longer visits for studying, using the computers, or reading the newspapers, were not allowed.

Luleå was described as a *'place filled with association-active people. But due to the pandemic, association life has been erased as no events are carried out'*. In 2020, *'not a single application was received to implement ...events'*. Here, concern was raised about whether such associations will continue after the pandemic.

Concern was also expressed about whether the cultural audiences will return after the pandemic, *'People have developed new patterns of behaviour'* and while attempts have been made to meet and hold events digitally, there is reduced demand.

Respondents from both the city and region saw that COVID-19 had resulted in a digital leap, *'Cultural practitioners have had to adapt to the pandemic and have therefore learned a lot about how to reach an audience via social media and other digital tools'*. For the region, this was seen as positive, as until now *'large parts of the cultural offer have been site-bound'*. However, this digital transition had not provided any income, and *'digital payment methods for visitors who take part in the cultural offer have not come very far yet'*.

Here a future model could be *'hybrids, a mixture of physical performances where digital participation is also possible'*.

Further concerns included the *'possible lack of skills after the pandemic. During the pandemic, many of those who have lived as freelancers, for example actors and musicians have shouldered other tasks in order to survive financially'*. The behaviour of future consumers was also a major cause for concern. *'Will people dare to take part of cultural events to the same extent as before?'*

While the private sector was mainly allowed to continue operating during the pandemic, retailers saw a dramatic but 'irregular impact' on trade. Here digitization was *'accelerated'*. In particular, food retail started to *'work with a mobile applications for ordering food'* with extended offers to *'takeaway food and weekend bags'*. During the pandemic people wanted, *'to treat themselves, people have therefore chosen to order food from restaurants'*. And after pandemic, one restaurateur thought it *'does not feel relevant to remove it'* in the future. Other non-food retailers, especially clothing, expressed that even before the pandemic they were challenged by e-commerce and during the pandemic, this has led to even greater losses.

Discussion

The aim of this study was to gain insight into how pandemic restrictions affected the urban social life in an Arctic city, as well as reflecting on how public safety can be protected while maintaining human connections.

The survey and interviews made in Luleå during the third wave, in the aftermath of the second wave, show that the restrictions put in place to reduce spread of the infection had a significant impact on public life and the use of the public realm in the Luleå case, which is in accordance with earlier research (Alraouf, 2021; Ellis & Grant, 2021; Frank, 2020; Honey-Rosés et al, 2020). While some public facilities were closed, restaurants, pubs, cafés and shops remained open with limitations, and society was functioning, as also noted in a recent study (Niitamo, 2021). However, the results show that people drastically limited their visits to the city centre, and their use of public transport and facilities (Simonen et al, 2021). In Sweden, travels with public transport reduced on average 42% 2020 from March when the pandemic started (WSP 2021).

The traditional role of the city and people's behaviour changed due to restrictions. Visits to the city centre faster and more efficient than before the pandemic. Here the focus was on what were considered essential activities. Secondary activities, such as visiting restaurants, cafés, or cultural offers either halted or were significantly reduced. In line with Batty's (2020) conjecture, the city and public realm were also used differently. It was clear that the respondents avoided places with a lot of movement during the pandemic, as similarly illustrated by Neuman et al (2021). Optional activities like strolling around the city without a goal and window-shopping (Gehl, 2011), were largely avoided. The winter weather and micro-climate also likely contributed to the limited use of outdoor spaces in the city centre; although exceptions were made in the planning regulations to allow restaurants and cafés to open outdoor seating areas earlier in the season, the main street Storgatan tends to be windy and is in shade large parts of the day even during summer.

No restrictions were made on moving around outdoors in Sweden, and data from the southern parts showed that a slightly higher share of residents increased their moderate outdoor activity such as walking during the pandemic, especially those in larger cities, while residents in smaller towns and villages maintained their levels of mobility. Especially the older residents reduced their mobility due to susceptibility to COVID-19 (Eek et al, 2021). Our data reflects that the youngest group's travels to the city centre were reduced, while the oldest tended to reduce their visits to the centre and services less. However, their general outdoor mobility was not measured. Place of residence, work, and studies could have impacted the need to use public spaces in the city centre.

Travel behaviour patterns also changed. Visits to the city centre were 'planned' to avoid rush hours and busy public transport, highlighting mobility based behavioural changes elicited by the

pandemic, as also shown by Büchel (2022). Even if biking or walking could be an option for some, there are barriers to soft mobility during winter and spring-winter; snow, ice and slush results in decreased movement due to comfort reasons or fear of slipping.

Online shopping and takeaway food were not introduced with the pandemic, but use of these services accelerated. This trend was recently reported by Hassankhani et al (2021) and Hyung (2021). Cultural events to a larger degree moved online during the pandemic, with the expectations of free access that are challenging for cultural institutions as professionals. Also, there was a concern that many initiatives and smaller cultural organisations would not be able to bounce back after the pandemic.

Overall, the restrictions put in place to reduce spread of the infection forced a change in people's relationship with the city (Honey-Rosés et al, 2020), which could impact the resilience of urban centres and their ability to bounce back after COVID-19 (Scott, 2020). The long-term effects can be challenging for both public and private sectors if people, as the respondents predict, keep the behaviours developed during the pandemic with online shopping, avoiding of crowds etc. This, in turn, can have different outcomes for public life and the public spaces (Sepe, 2021). On one hand, digitalisation could lead to the city centres being less frequented, draining urban life (Abusaada & Elshater, 2021). On the other hand, the desire to have a social life, in which public places are key, could lead to an increased use of the city centres at 'odd' hours. If to avoid crowds and rush hours, higher accessibility to facilities can enable this.

Representing half of the respondents, and distinctive to the youngest age group, were additional comments on feeling lonely and jaded and experiencing disappearing social networks. Partly this can be reflected by many student responses, where those who have moved to Luleå to study are likely to have a weaker social network. Also, many students returned to their hometowns when the university shifted to online teaching. Similarly, Elmer et al (2020) found that physical isolation, lack of interaction and emotional support were associated with negative mental health trajectories among students. However, Eek et al (2021) noted that mental wellbeing is not consistently associated with being physically active, through activities such as walking, during the pandemic. Reasons could relate to the fact that no restrictions were made on moving around outdoors in Sweden, the density of neighbourhoods, and the age of the citizen. The youngest age group also commented on taking on responsibility by following guidelines and recommendations. It is interesting to note in regard to the Swedish strategy its focus on softer restrictions and balancing individual rights and the common good (Bauhn 2022), which placed expectations on individuals to obey. As such this could explain our results of older people using the city centre to a greater extent, made possible by others using it less.

Future research should, in a larger scale data collection, further investigate the perceptions, rationales, behaviour, and visions of the diverse population groups in Arctic settlements.

Methodologically, a note needs to be made that the sample is cross-sectional and rather small. As such, the results reflect the perceptions of a limited number of residents, mainly younger and university students, who are primarily represented in the results. Possible biases in the reported data could be recall biases, protests, or social expectations.

However, the strength of this data collection is that it happened during a brief and specific window of time. People had already experienced more than twelve months with COVID induced public and eventual individual restrictions due to illness or susceptibility and the public restrictions and recommendations had recently been further enhanced. As such this data gives valuable insights. It is acknowledged that if asked to recall older memories of situations people perceive situations based on where they are today and their current knowledge base, as both individual and societal knowledge is evolving. This could be applied to how respondents recall their use of urban centres before the pandemic, and how the results from this data should be understood when read about today.

Another strength of this study is the mixed methods design. Quantitative and qualitative information from residents as well as representatives from the public and private sector gives a deeper understanding of the pandemic situation in this Arctic city in March 2021.

A higher proportion of younger residents that are mainly students are represented in this sample (54% of respondents between the age of 20 and 29 years, in comparison with the proportion (14%) of this age group in Luleå). The age group of 30-59 years old matches the overall Luleå proportion, with 40% in our sample and 38% in Luleå. Also, the gender distribution was slightly higher for women in our sample (57% women and 42% men, while in Luleå the proportion is about 49% women and 51% men).

Conclusion

This research focusing on an Arctic city during COVID-19 shows consistent results with similar studies from other parts of the world. It shows that in the Swedish European Arctic, there was a rapid transition to digital solution for work, commerce, and social activity. Equally, there was a rapid reduction of city usage. Importantly, the research shows that during the pandemic, the city centre remained important for ‘necessary activities’. However, necessary visits were no longer combined with other more social or recreational activities traditionally associated with city visits. Here optional activities were either decreased or abandoned. This is important, as such activities are seen as vital to the dynamics that make cities attractive for people to visit. Finally, the results suggest that the restrictions illustrated to people the social importance of the city and outdoor public space of an Arctic city in winter. While temperatures were commonly below 0°C and can reach -14°C during the survey period, people commonly highlighted the benefits of outdoor activity for physical and mental wellbeing. They also referenced the importance of unique Arctic public realm structures such as the Ice-Road as destinations in winter. This suggests that outdoor winter social activity is important and that as restrictions are removed, the social dimension of Arctic cities are likely to bounce-back.

References

- Abusaada, H., & Elshater, A. (2021). COVID-19 and “the trinity of boredom” in public spaces: urban form, social distancing and digital transformation. *ARCHNET-IJAR INTERNATIONAL JOURNAL OF ARCHITECTURAL RESEARCH*. <https://doi.org/10.1108/ARCH-05-2021-0133>
- Alraouf, A. A. (2021). The new normal or the forgotten normal: contesting COVID-19 impact on contemporary architecture and urbanism. *ArchNet-IJAR*, 15(1), 167–188.
- Batty, M. (2020). The Coronavirus crisis: What will the post-pandemic city look like? *ENVIRONMENT AND PLANNING B-URBAN ANALYTICS AND CITY SCIENCE*, 47(4), 547–552.
- Bauhn, P. (2022). The Common Good and Individual Rights in Pandemic Times: The Case of Sweden’s COVID-19 Strategy. In: Boylan, M. (eds) *Ethical Public Health Policy Within Pandemics*. The International Library of Bioethics, vol 95. Springer, Cham. https://doi.org/10.1007/978-3-030-99692-5_2
- Breheny, M. (1997) Urban compaction: feasible and acceptable? *Cities*, vol.14, no.4, pp.209-217.
- Büchel, B., Marra, A. D., & Corman, F. (2022). COVID-19 as a window of opportunity for cycling: Evidence from the first wave. *Transport Policy*, 116, 144–156.
- Campbell, K., & Cowan, R., (2002) *Re:Urbanism: A Challenge to the Urban Summit*, Urban Exchange.
- Carmona, M. (2021). *Public places urban spaces: the dimensions of urban design*. (Third edition.) New York: Routledge.
- Chan, C.B., Ryan, D.A. (2009). Assessing the Effects of Weather Conditions on physical Activity Participation Using Objective Measures. *Int. J. Environ. Res. Public Health*, 2009; 6:2639-2654

- Chapman, D. (2021). Is climate a modifier and shape-giver in urban morphology? *Journal of Urban Morphology*, 25.1, 5-8. <https://doi.org/10.51347/UM25.0007>
- Chapman, D., Nilsson, K., Rizzo, A., & Larsson, A. (2019). Winter City Urbanism: Enabling All Year Connectivity for Soft Mobility. *Int. J. Environ. Res. Public Health*, 16, 1820; doi:10.3390/ijerph16101820
- Chapman, D. (2018). *Urban design of winter cities: Winter season connectivity for soft mobility* (PhD dissertation). Luleå. Retrieved from <http://urn.kb.se/resolve?urn=urn:nbn:se:ltu:diva-70507>
- Eek, F., Larsson, C., Wisén, A., Ekvall Hansson, E. (2021). Self-Perceived Changes in Physical Activity and the Relation to Life Satisfaction and Rated Physical Capacity in Swedish Adults during the COVID-19 Pandemic—A Cross Sectional Study. *International Journal of Environmental Research and Public Health*, 18(2): 671. doi:10.3390/ijerph18020671
- Ellis., G. & Grant., M. (2021). The COVID-19 lockdown papers: insights, reflections and implications for urbanism and city planning, *Cities & Health*, DOI: 10.1080/23748834.2021.1927532
- Elmer, T., Mephram, K., & Stadtfeld, C. (2020). Students under lockdown: Comparisons of students' social networks and mental health before and during the COVID-19 crisis in Switzerland. *Plos one*, 15(7), e0236337.
- Folkhälsomyndigheten. (2021). *Nationella allmänna råd och rekommendationer för att minska spridningen av covid-19*. Hämtad 2021-02-11 från Folkhälsomyndigheten, <https://www.folkhalsomyndigheten.se/smittskydd-beredskap/utbrott/aktuella-utbrott/covid-19/skydda-dig-och-andra/rekommendationer-for-att-minska-spridningen-av-covid-19/>
- Frank, A. I., (2020) Observations of a Pandemic Flâneuse: Behaviour Change and Adapting Public Space in Birmingham, United Kingdom, *disP - The Planning Review*, 56:4, 26-33, DOI: 10.1080/02513625.2020.1906048
- Frey, H. (1999). *Designing the City, Towards a More Sustainable Urban Form*. E & FN Spon.
- Gehl, J. (2011). *Life between buildings: Using public space*. Washington, DC: Island Press.
- Hassankhani, M., Alidadi, M., Sharifi, A., & Azhdari, A. (2021). Smart city and crisis management: Lessons for the covid-19 pandemic. *International Journal of Environmental Research and Public Health*, 18(15) doi:10.3390/ijerph18157736
- Hidman, E. (2018). Attractiveness in Urban design. *Nordic Journal of Architectural Research*, 3, 7–28.
- Johansson, R. (2002). Ett explikativt angreppssätt – Fallstudiemetodikens utveckling, logiska grund och betydelse i arkitekturforskningen, *Nordic Journal of Architectural Research*, 2, 19-29.
- Honey-Rosés, J., Anguelovski, I., Chireh, V., Daher, C., van den Bosch, K., Litt, J., Mawani, V., McCall, M., Orellana, A., Oscilowicz, E., Sánchez, U., Senbel, M., Tan, X., Villagomez, E., Zapata, O., & Nieuwenhuijsen, M. (2020): The impact of COVID-19 on public space: an early review of the emerging questions – design, perceptions and inequities, *Cities & Health*, DOI: 10.1080/23748834.2020.1780074
- Hyung, M. K., (2021) Chapter 16, Smart Cities for Technological and Social Innovation, in *Smart cities beyond COVID-19*, Editor(s): Hyung Min Kim, Soheil Sabri, Anthony Kent, Academic Press, Pages 299-308, <https://doi.org/10.1016/B978-0-12-818886-6.00016-2>.
- Jenks, M. Burton, E. and Williams. K. (eds) (1996) *The Compact City: A Sustainable Urban Form?*, E & FN Spon, London.
- Larsson, A., & Chapman, D. (2020). Perceived impact of meteorological conditions on the use of public space in winter settlements. *International Journal of Biometeorology* 64, 631–642. <https://doi.org/10.1007/s00484-019-01852-5>
- Luleå Council. (2020-12-14). *Befolkningsstatistik*. Hämtad. 2021-02-08 från Luleå kommun, <https://www.lulea.se/kommun--politik/fakta-och-statistik/befolkningsstatistik.html?qs=Befolkningsstatistik>
- Luleå Council. (2021-01-21) *Stadsdelar i Luleå*. Hämtad 2021-02-08 från Luleå kommun,

<https://www.lulea.se/boende--miljo/bostader-och-bostadsomraden/bo-i-lulea-kommun/stadsdelar-ilulea.html>.

Mäkinen, T. M., Raatikka, V. P., Rytönen, M., Jokelainen, J., Rintamäki, H., Ruuhela, R., Näyhä, S., & Hassi, J. (2006) Factors affecting outdoor exposure in winter: population-based study. *Int J Biome-teorol.* Sep;51(1): 27-36.

Mehta, V., (2013). *The Street, A Quintessential Social Public Space*. Routledge.

Neuman, M., Chelleri, L., & Schuetze, T. (2021). Post-Pandemic Urbanism: Criteria for a New Normal. *SUSTAINABILITY*, 13(19). <https://doi.org/10.3390/su131910600>

Newman, P. & Kenworthy, J. (1989) *Cities and Automobile Dependence*, Gower Publishing Company Limited.

Niitamo, A. (2021) Walking as urban communication: affordances and agency in public space in a semi-lockdown city, *Cities & Health*, DOI: 10.1080/23748834.2021.1978786

Nyseth, T., 2017. Arctic Urbanization: Modernity Without Cities. In: Körber LA., MacKenzie S., Westerståhl Stenport A. eds. *Arctic Environmental Modernities*. Palgrave Studies in World Environmental History. Palgrave Macmillan, Cham. https://doi.org/10.1007/978-3-319-39116-8_4

Olsson, S. (2000). *Stadens attraktivitet och det offentliga stadslivet*. Working paper, Göteborgs universitet, Institutionen för socialt arbete. Hämtad 2021-02-25 från <https://www.diva-portal.org/smash/get/diva2:227338/FULLTEXT01.pdf>.

Pashakhanlou, A. H. (2022). Sweden's coronavirus strategy: The Public Health Agency and the sites of controversy. *World Med. & Health Policy*, 14, 507– 527. <https://doi.org/10.1002/wmh3.449>

Region Norrbotten (2021) *Nu gäller skärpta råd och restriktioner från Smittskydd Norrbotten*. Pressrelease, published 2021-05-08. <https://www.norrbotten.se/sv/Halsa-och-sjukvard/Smittskydd-i-Norrbotten/Information-om-nya-coronaviruset/Nyhetsarkiv-Nya-coronaviruset/Folj-de-skarpta-rad-en-fran-Smittskydd-Norrbotten/>

Satish Rupraoji Billewar, Karuna Jadhav, V.P. Sriram, Dr. A. Arun, Sikandar Mohd Abdul, Kamal Gulati, Dr Narinder Kumar Kumar Bhasin (2021) The rise of 3D E-Commerce: the online shopping gets real with virtual reality and augmented reality during COVID-19, *World Journal of Engineering*, DOI 10.1108/WJE-06-2021-0338

Scott, M., (2020). Covid-19, Place-making and Health, *Planning Theory & Practice*, 21:3, 343-348, DOI: 10.1080/14649357.2020.1781445

Sennett, R. (2002[1977]). *The fall of public man*. London: Penguin Books.

Sepe, M. (2021). Covid-19 pandemic and public spaces: improving quality and flexibility for healthier places. *URBAN DESIGN INTERNATIONAL*, 26(2), 159–173. <https://doi.org/10.1057/s41289-021-00153-x>

SFS 2004:168. Smittskyddslag. Stockholm: Socialdepartementet.

Simonen, J., Moilanen, M., Westin, L., Hersinger, A., Östbye, S., Svento, R., & Riepponen, T. (2021). *The Covid-19 Pandemic and Regional Economic Resilience in Northern Finland, Norway and Sweden: a pre-study*.

SMHI. (2023, May 25). *Hur var vädret?* Retrieved from <https://www.smhi.se/klimat/klimatet-da-och-nu/hur-var-vadret/q/Lule%C3%A5/temperature>

Sjöholm, J., & Hidman, E. (2020). Urban conservation and urban morphology in Kiruna, Sweden. *Urban Morphology*, 24(2), 167–183.

Sudjic, D. (1992) *The 100 Mile City*, André Deutsch Limited.

Tunström, M., Lidmo, J., & Bogason, Á. (2018). *The Compact City of the North : – functions, challenges and planning strategies*. <https://doi.org/10.30689/R2018:4.1403-2503>.

Urban Task Force. (1999). *Towards an Urban Renaissance*, DETR.

Wallentin, F. (2007). *Teorier om socialt liv på offentliga platser*. Examensarbete, Sveriges lantbruks-universitet, Institutionen för stad och land. Hämtad 2021-01-29 från https://stud.epsilon.slu.se/11967/1/wallentin_f_171115.pdf.

World Health Organization. (2020-06-29). *Listing of WHO's response to COVID-19*. Hämtad 2021-01-21 från World Health Organization, Listings of WHO's response to COVID-19.

WSP (2021) *Kollektivtrafikens ekonomiska återhämtning efter coronapandemin*.
<https://www.svenskkollektivtrafik.se/globalassets/svenskkollektivtrafik/dokument/aktuellt-och-debatt/publikationer/kollektivtrafikens-ekonomiska-aterhamtning-efter-coronapandemin-2021.pdf>