

# Shaping the New Normal

## : Exploring the Long-Term Effects of COVID-19 on Perception and Behavior in Urban Spaces in Seoul and Shanghai\*

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### Abstract

This comparative study examines the shifts in perception and behavior among urban residents in Seoul and Shanghai during the COVID-19 pandemic. The findings reveal significant disparities in perception and behavior between the cities and variations within each city at different stages of the pandemic. Shanghai residents had a higher perception of the pandemic's impact compared to Seoul, which can be attributed to the implementation of more stringent COVID-19 prevention policies in Shanghai, including comprehensive restrictions on personal movement and the closure of non-essential facilities. The pandemic significantly affected the perception of urban spaces, with Seoul residents showing a stronger association between urban characteristics and disease transmission compared to Shanghai. This can be explained by Seoul's higher population density, making it more susceptible to COVID-19 transmission. In contrast, Shanghai's decentralized urban growth and multiple central business districts provided residents with more diverse options for visiting different areas, potentially reducing their perception of risk. Shanghai also exhibited a higher fear of infection compared to Seoul, likely due to the prolonged and stringent nature of disease control measures, which resulted in significant economic damage. Overall, the study highlights significant disparities in perception and behavior between Seoul and Shanghai during the COVID-19 pandemic, influenced by factors such as government policies, population density, and economic impact. The findings provide valuable insights into the impact of the pandemic on urban residents in East Asia.

**Keywords** Pandemic, Seoul, Shanghai, Urban Space, One-Group Pretest-Posttest Design

**주제어** 팬데믹, 서울, 상하이, 도시공간, 단일집단 사전-사후설계

## 1. Introduction

Most countries and their cities are currently recovering from the long-lasting effects of the COVID-19 pandemic, which has affected the world since late 2019, spanning

almost three and half years.

Although progress is being made, the pandemic's impact continues to linger, and its lasting impact will shape the direction of society's restoration and the establishment of a new normal. One notable consequence of the pandemic is

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its influence on people's perception and utilization of urban spaces.

The heightened awareness of infectious diseases in enclosed environments has prompted changes in people's mobility patterns, resulting in a shift towards outdoor spaces, particularly green areas, where individuals can maintain a safe physical distance from others (Landry et al., 2021; Ugolini et al., 2020). The preference for outdoor spaces has persisted even after the end of the pandemic, leading to various behavioral changes in the utilization of these outdoor areas.

This study aims to assess the pandemic's lasting impact on creating a new society. Specifically, the research focuses on perception, attitude, and behavior (e.g., consumption, health, work, shopping, and leisure or tourism) at the individual level. At the city and regional level, intensive studies have been conducted on how the environment, economy, housing, and community have changed in this short period of time (e.g., Bago et al., 2021; Chollisni et al., 2022; Debata et al., 2020). However, a remaining issue of COVID-19 research is that most of it has focused on statistics or surveys conducted at a single point in time with a specific city as a case. While infectious diseases spread globally, the perception and behavioral changes related to these diseases can differ significantly based on each country's response to the diseases as well as its cultural, political, and socio-economic context. Notably, response policies to infectious diseases differ among nations, and their impact can vary depending on urban settings.

Specifically, this study aims to compare and contrast these changes between Seoul and Shanghai, two East Asian megacities with comparable urban settings. Both cities experienced confirmed cases of COVID-19 around the same time and share similarities as economic and transportation hubs with densely developed areas. However, they differ in terms of disease control policies, as well as political and cultural characteristics, which may lead to diverse influences on individuals' perceptions and behaviors during the pandemic. Data for the study were collected through surveys conducted in both cities using the same questionnaire format. The surveys were conducted during similar time periods and repeated twice over the course of one year. If similar changes occurred in both cities, it implies a certain level of generalizability. Conversely, if different changes were observed, further investigation was conducted to identify

the factors contributing to these differences, including group interviews with experts familiar with each city.

In Seoul, both surveys used the same respondents, enabling inferential statistics like paired t-tests to assess consistent or differentiated changes due to the pandemic. This helps determine if changes were temporary or adaptive over a year. Surveys were conducted during similar daily case counts to control for their influence. The study also assessed if perceptions and behaviors were maintained or strengthened (e.g., learning effect). Using a quasi-experimental design, it compared pre-pandemic and post-pandemic data from the experimental and comparison groups (Seoul and Shanghai) to enhance reasoning validity.

The remaining sections of the paper are structured as follows: The next section reviews planning literature to explore the main survey items, focusing on the perceptions and behaviors affected by the pandemic. The methodology of the study is then detailed, including the pandemic trends in Seoul and Shanghai, the economic damage attributed to the pandemic, and the countermeasures implemented. The survey design, including sampling and questionnaire details, is also described. This is followed by descriptive statistics of the survey responses and inferential statistics (independent samples t-test, paired sample t-test) to examine whether the effects of the pandemic were consistent or different in the two cities (Seoul and Shanghai) and between the first and second peaks (in Seoul). Finally, the study concludes with the interpretation of the main findings and presents a few policy implications.

## II. Literature Review

The outbreak of the COVID-19 pandemic has brought about profound transformations in urban spaces, reshaping the ways people interact, move, and perceive their built environments. Traditionally, cities are designed to facilitate social interaction and gatherings among strangers, with considerations for accessibility and intended purposes (Oh, 2022; Stevens, 2006). However, it is important to note that urban spaces have played a role in the transmission of COVID-19, with over 90% of confirmed cases occurring in urban areas (UN, 2020). As global urbanization rates continue to rise, reaching 56%, and with over 80% of GDP being generated in cities (World Bank, 2023), cities' vulnerability to

infections and the implementation of preventive policies have significantly influenced people's lives, leisure activities, and spatial visits within urban areas. This session provides a comprehensive examination of the pandemic's effects on cities and its impact on people's perceptions and behaviors, particularly highlighting the vulnerability of cities to infectious diseases and the changes in individuals' perceptions and behaviors resulting from infection control policies.

Compared to previous pandemics, COVID-19 stands out for its rapid global spread. Its primary mode of transmission through respiratory droplets has made urban spaces characterized by "Closed, Crowded, Close contact (3Cs)" particularly susceptible to transmission (WHO, 2021). Mass infections have been reported in enclosed indoor spaces where adherence to personal protective measures and social distancing is challenging (Yip et al., 2021). The Korean Disease Control and Prevention Agency (KDCA) attributed these mass infections to the unique characteristics of enclosed spaces with poor ventilation, where individuals remove their masks to eat and drink (KDCA, 2022). Similarly, a mass infection transmitted through air conditioners in a restaurant was reported in China, underscoring the vulnerability of densely populated areas with inadequate ventilation and close contact among individuals, leading to rapid infection spread (Lu et al., 2021).

The COVID-19 pandemic has brought about various changes in urbanism interventions and policies aimed at controlling the spread of infectious disease. These changes include alterations in physical activity, the implementation of social distancing and home isolation measures, and shifts in choice of urban spaces and transport options (Rojas-Rueda and Morales-Zamora, 2021). The pandemic has also had a significant impact on individuals' perceptions of urban spaces, leisure behavior, and their sense of community. It has resulted in reduced mobility, adverse economic conditions such as unemployment and decreased income levels (Kemp and Spearritt, 2021; Lee and Yang, 2022). Furthermore, commercial activities have been significantly affected, with a notable shift towards online consumption resulting in the decline of traditional retail sectors (Zhou et al., 2023).

The changes in perception and behavior regarding urban spaces during the pandemic can be attributed to both government response policies and individual risk perception. The KDCA implemented measures such as regulating the

number of users and operating hours of multi-use facilities based on distancing guidelines have influenced people's utilization of urban spaces (Kim, M. H. et al., 2021). Many countries have controlled or closed the use of multi-use facilities in cities (Honey-Rosés et al., 2021). Additionally, the increased awareness of risks associated with indoor spaces and the sharing of numerous cases of mass infections through mass media and social networking platforms have heightened the risk perception associated with urban spaces (Faruk et al., 2022). Therefore, there has been a noticeable decline in foot traffic in commercial facilities and city centers, as people have congregated less in these areas (Song et al., 2023). The utilization of urban spaces has fluctuated according to the course of the COVID-19 outbreak and the intensity of policy measures (Benzell et al., 2022).

On the other hand, outdoor spaces have been perceived as safer due to their ample ventilation and the ability to maintain social distancing. In urban areas, there has been a surge in the number of people utilizing urban parks, and a growing interest in leisure activities that involve connecting with nature, such as camping and hiking. Additionally, there has been an increased preference for outdoor leisure activities and individual pursuits at home in urban settings (Kim, H. et al., 2023).

Furthermore, the prolonged time spent at home during the pandemic has led to exacerbated social conflicts within communities, particularly in densely developed urban areas with shared living spaces (apartment complexes or multi-family residences). The pandemic has led to increased time spent at home, with 35 percents increased compared to before COVID-19 (Aljanzeera, 2020). The prolonged time spent at home has led to increased incidents of neighbor-to-neighbor conflicts such as noise disturbances (Hoehn-Velasco et al., 2020). Additionally, increased contact within families has led to a rise in domestic tensions and conflicts, in addition to domestic violence incidents. However, the impact of the pandemic on the perception that one's health is affected by others and the sense of community prior to the pandemic can influence the impact of the pandemic in different ways.

The impact of infectious diseases can vary depending on infection control policies and the characteristics of residential areas. In particular, the effects of infectious diseases on cities and individuals' perceptions of them can differ based

not only on social, economic, and infrastructural factors but also on cultural, historical, and political differences. For example, East Asian and Pacific countries have shown a higher level of risk perception regarding infectious diseases compared to other regions (Sub-Saharan Africa, the Middle East, and Latin America) (Huy et al., 2021). During major outbreaks such as the 2002 SARS and 2015 MERS, East Asian countries were able to respond quickly by establishing the necessary systems and infrastructure for infectious disease control. Hong Kong, Taiwan, and South Korea, which have experienced past epidemics, responded rapidly to the spread of COVID-19 compared to Western countries and exhibited a high level of voluntary participation in personal hygiene practices to avoid infection (Kim, J.H. et al., 2023). Moreover, within East Asia, political and cultural differences among countries have influenced specific responses to infectious diseases, ultimately having a significant impact on the perception of infectious diseases and individuals' behaviors. Notably, countries in East Asia, including Chinese cities such as Wuhan, where the first outbreak of COVID-19 was reported, implemented large-scale testing and surveillance systems to swiftly identify and isolate confirmed cases. Even within East Asia, the political and cultural differences among countries influenced detailed responses to infectious diseases, consequently resulting in meaningful effects on the perception of infectious diseases and individual behaviors.

Understanding the multidimensional changes in urban spaces caused by the pandemic and comparing the vulnerability to infectious diseases in settings resembling megacities is crucial for enhancing preparedness for future pandemics. The cultural and political characteristics of cities, along with their preventive behaviors, have a significant impact on individuals' perceptions and behaviors during a pandemic.

### III. Research Design

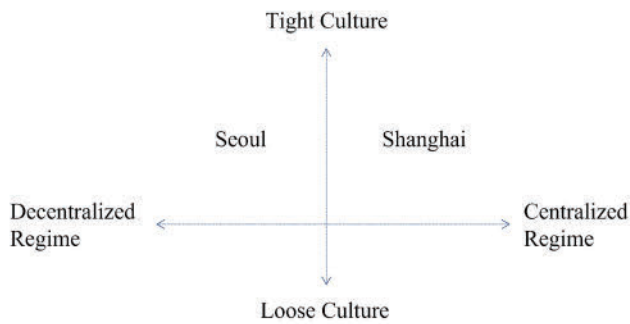
#### 1. Research Area

This study examines the comparison of the impact of the COVID-19 pandemic in two megacities with comparable urban settings and their responses to prevent the transmission of the virus. Specifically, our focus is on cities that experienced the initial stages of the pandemic. Seoul in South Korea and Shanghai in China are selected as the research

areas. Both Seoul and Shanghai encountered the first reported COVID-19 infection at a similar time during the early stage of the pandemic, following the initial confirmed case reported by the WHO in December 2019. Consequently, both city and central governments implemented multiple countermeasures to curb the spread of the disease. It is noteworthy that Seoul and Shanghai are among the megacities with the highest population density in their respective countries and regions (UN, 2018). Furthermore, due to their dense populations, these cities serve as significant transportation and economic hubs. However, these cities exhibited different patterns in their responses to the pandemic.

Since the outbreak of COVID-19 was reported in Wuhan in December 2019, the Chinese government implemented large-scale quarantine measures to restrict the spread of the virus in the adjacent areas and enforced nationwide isolation measures. Additionally, they took the lead in COVID-19 response through a robust centralized control system, with local governments strictly following the central guidelines. On the other hand, South Korea confirmed COVID-19 cases through extensive diagnostic testing. They actively conducted tests not only on symptomatic individuals but also on asymptomatic cases through a phased testing approach. Similar to China, South Korea provided prompt and accurate information to the public through smartphone-based tracking systems and rapid information disclosure. Both China and South Korea emphasized government-led efforts, such as intensive and large-scale testing, contact tracing, and strengthening public health awareness. However, China took a proactive approach through strong central control, while South Korea focused on the cooperation of its citizens and individual responsibilities (see <Figure 1>).

This difference can be attributed to the political and cultural disparities between the two countries. China exhibits a centralized political structure, where local governments tend to comply with the directives and control of the central government. Therefore, large-scale isolation measures or coercive actions can be implemented, and the cultural emphasis on public order and collectivism contributed to the implementation of rigorous COVID-19 prevention policies. The perception that individual behavior can impact public safety and the prioritization of public well-being influenced COVID-19 response policies such as urban lockdowns, large-scale quarantines, and contact tracing. On the



**Figure 1.** Critical contextual factors shaping COVID-19 countermeasures

other hand, South Korea demonstrates cultural characteristics that emphasize individual responsibility and participation. While the government's role remains important, they emphasize individuals' voluntary participation and cooperation for the safety and interests of the community. These characteristics influenced the implementation of COVID-19 response policies, including testing, contact tracing, personal hygiene practices, and social distancing measures.

## 2. Countermeasures against COVID-19 in Seoul and Shanghai

### 1) Seoul

The first confirmed case in Seoul was reported on January 20, 2020, followed by a subsequent increase in new cases. In response, the KCDA promptly implemented measures to address the spread of COVID-19. During the early stages of the COVID-19 pandemic, the government focused on the goal of containing the spread of infectious disease by implementing the 3T strategy: testing, tracing, and treatment. Social distancing policies were introduced by the KCDA, initially in five phases. The social distancing policies have evolved over time, with multiple versions being implemented as the pandemic has progressed. The social distancing policy is adjusted based on key epidemiological indicators such as the average daily number of confirmed cases, the reproduction number of infections, severity, weekly mobility, as well as the capacity of medical response and vaccination rates (MOHW, 2021). Based on the first-round survey conducted in this study, the social distancing policies can be outlined as follows.

The social distancing phases were determined based on the weekly average of daily confirmed cases nationwide. The lower level of social distancing phases was focused on rein-

forcing personal preventive behaviors. For example, Phase 1 included mandatory mask-wearing in urban areas and maintaining a two-meter distance between individuals. When the transmission trend escalated to the local transmission stage, the government raised the social distancing policy to Phase 1.5 or 2. In this phase, the number of group gatherings and opening houses of urban spaces were limited. Visiting specific urban spaces prone to disease transmission was even prohibited. Notably, measures were implemented to control the number of visitors and operating hours of nightlife venues and hygiene facilities. The first round of surveys was conducted during Phase 2 of the social distancing policies. Phase 2.5 represented the nationwide community transmission stage, banning gatherings and indoor sports or cultural events. During this phase, stricter restrictions and monitoring policies were implemented in urban spaces. Phase 3 marked the highest and strictest level of the policy, known as the nationwide community transmission stage. During this phase, all public spaces, except essential facilities, were subject to limited operations. As the level of social distancing policies increased, limitations were imposed on private gatherings, sports viewing, schooling, religious activities, and work.

The social distancing policy implemented during the second-round survey period corresponds to the revised version. The social distancing policy was adjusted on a regional and sectoral basis, taking into account factors such as transmission routes, increases in small and large-scale outbreaks, regional disparities, and characteristics of various multi-use facilities. The revised version simplified the stages to four levels, allowing each local government to adjust the stages based on the local epidemic situation and their epidemic response capacity. The second survey was conducted during a period when the social distancing policy was maintained at level 4. At that time, a severe outbreak had been ongoing for over three months, starting in early July in the capital area, and the vaccination rate had reached 63% before gradually declining. In anticipation of the transition to "Living with COVID-19" (beginning of the return to normalcy), the authorities announced a relaxation of measures targeting fully vaccinated individuals starting from November 2021. The transition process was scheduled to be prepared while maintaining level 4 restrictions in October (BBC NEWS, 2021).

In addition, South Korea, which did not enforce stringent lockdown measures, sought to raise awareness of infectious diseases and promote social distancing policies through various campaigns. For instance, during the early stages of the COVID-19 outbreak, a campaign called “Thanks to You Challenge (덕분에 챌린지)” was launched to express gratitude and support to healthcare professionals working on the frontline and to encourage voluntary participation in social distancing measures. The campaign involved a relay of support, where government officials, celebrities, and ordinary citizens participated by taking photos of themselves wearing masks and making hand gestures representing respect in sign language. These photos were then shared on personal social media accounts. Through this campaign, the importance of supporting healthcare professionals responding to COVID-19 and the collective efforts required to maintain everyday life were emphasized. In particular, the significance of forming connected values within a community society in response to the pandemic was emphasized, highlighting the efforts of each stratum to overcome risks (Yun et al., 2021). It conveyed support for healthcare professionals fighting against COVID-19 on the frontlines in negative pressure wards and underscored the need for everyone to make efforts to protect their ordinary and mundane daily lives. In the photo, they are showing their support for the <Figure 2>, the participation of key figures from the disease control agency highlights the importance of their dedication and efforts in combating infectious diseases such as COVID-19.



**Figure 2.** Dr. Jeong Eun-kyung, the Director of the Korea Disease Control and Prevention Agency, along with other staff members from the agency, participated in the “Thanks to You Challenge.”

Source: Central Disease Control Headquarters

## 2) Shanghai

Since the first confirmed case was reported on January 20, 2020, the Shanghai municipal authority promptly implemented a lockdown policy to control the transmission of COVID-19. Public transportation, including express buses, subways, railways, and inter-city buses, were temporarily suspended. Public facilities such as museums, libraries, and theaters were closed, and events that could lead to gatherings were banned. Shanghai adhered to a zero-COVID policy, promptly identifying confirmed cases and implementing mass nucleic acid testing, home quarantine, isolation measures, and contact tracing to prevent transmission at the neighborhood level. As China shifted its approach from an absolute zero-tolerance stance to a “dynamic zero-COVID” policy, Shanghai also adopted a similar approach. Under this policy, a few reported infections would no longer trigger city-wide lockdowns. Instead, targeted lockdowns were swiftly implemented in specific areas when a community recorded more than two new cases within a 14-day period. These more flexible preventive measures aimed to strike a balance between disease control and allowing individuals to maintain their normal lives. It became evident that many provinces struggled to sustain a zero-case count, which differed from their performance from 2020 to 2021 (Chen, 2022).

In March 2022, when the Omicron variant began to spread, Shanghai, the largest metropolis in China, implemented a two-stage lockdown. This city-wide lockdown included measures such as remote work mandates, suspension of public transportation, and ride-hailing services. Prior to this, only a few communities had experienced short-term lockdowns aimed at containing disease hotspots. The initial phase of the lockdown focused on the eastern part of the city, while the second phase targeted the western region (Cheshmehzangi et al., 2022). The city-wide lockdown was lifted two months after its implementation, but China's zero-COVID policy remained in effect. Eventually, China eased the zero-COVID policy in a phased manner (BBC NEWS, 2022/06/01).

## 3. Data

This study performed online surveys to examine the differences in changes caused by the pandemic between the

two megacities. The surveys were conducted in Seoul and Shanghai using identical questionnaires at similar time periods. The survey in Seoul was conducted in two rounds: the first round from September 23 to October 7, 2020, and the second round from October 8 to October 26, 2021. The second round targeted the 300 participants from the first survey. The first survey coincided with the second wave of COVID-19 (August 12 to November 12, 2020) (Ha et al., 2023) characterized by sporadic cluster infections through personal contact and spread in densely populated urban spaces. Of the 538 respondents in the first survey, 300 participated in the second round.

In Shanghai, we conducted a survey from February 18 to March 4, 2022 (523 participants), to assess changes in personal characteristics (such as cognitive health status) and the impact of the pandemic, among other factors. We also examined changes in perceptions and behaviors in urban and leisure spaces. While a panel survey was conducted in Seoul, Shanghai conducted a single round survey to evaluate changes in perceptions and behaviors both before and during the pandemic. Random quota sampling was employed in the both cities according to age and gender. <Table 1> presents the demographic characteristics of the survey participants. The questionnaire was reviewed by seven planning experts from universities in South Korea, China, Taiwan, and Indonesia.

The survey items used in the study were as follows: (1) individual perceptions of infectious diseases, (2) perceptions and behaviors related to urban spaces, (3) perceptions and behaviors related to leisure and tourism activities, (4) perceptions of communities following the pandemic, and (5)

economic activities. Among these, the analysis of (2) perceptions and behaviors related to urban spaces and (3) perceptions and behaviors related to leisure and tourism activities focused on the current period (during the pandemic) and involved a pre-post comparison design with a control group. The survey results measured using the Likert scale were converted to a scale of 100 points for analysis purposes.

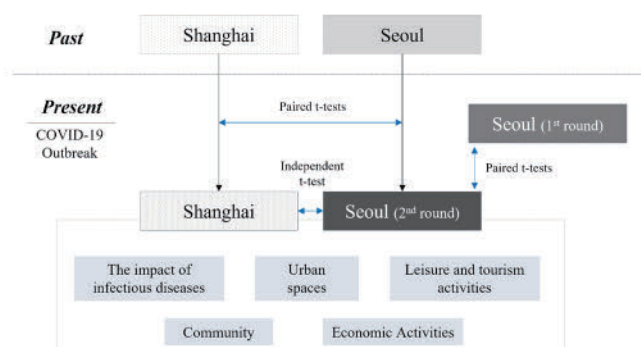
#### 4. Method

To compare the perception and behavioral changes resulting from the COVID-19 pandemic, this study employed a one-group pretest-posttest comparison group design. The pretest-posttest comparison group design is a research design technique that evaluates the effects by comparing an experimental group with a control group (Gliner et al., 2003). In this design, a pretest was conducted in each city before the pandemic intervention occurred, and the results were compared through a posttest (Figure 3). The pretest measures the initial conditions of each city before the experiment, taking into account pre-existing differences, to evaluate the post-intervention effects. This enables a comparison between the pre- and post-intervention periods and enhances the validity of the experimental results. Additionally, the posttest assesses the impact of the pandemic and is suitable for measuring its effects through statistical analysis.

This study applied a one-group pretest-posttest design to compare the perception and behavioral changes resulting from the COVID-19 pandemic in Seoul and Shanghai. In this study, we employed quantitative and qualitative approaches. Quantitative assessments were executed using paired and independent t-tests. Simultaneously, a qualitative analysis was undertaken through semi-structured interviews with five experts.

**Table 1.** Demographics of survey participants

Items	Seoul	Shanghai
Age	10s-20s	179 (34.2%)
	30s	231 (44.2%)
	40s	90 (17.2%)
	50+ years old	23 (4.4%)
Gender	Male	211 (40.3%)
	Female	312 (59.7%)
Education level	Middle school	4 (0.8%)
	High school	21 (4%)
	University/College	405 (77.4%)
	Postgraduate	93 (17.8%)



**Figure 3.** Research framework

The quantitative analysis aimed to identify the effects of the pandemic on perception and behavioral changes and analyze the differences between the two cities. Survey items were derived from prior research and focused on (1) the impact of infectious diseases, (2) urban spaces, (3) leisure and tourism activities, (4) community, and (5) economic activities. Independent t-tests were performed to compare the cities, interpreting the results based on items, perceptions and behaviors, showing significant differences. Paired t-tests were conducted to examine whether there were significant differences between the pretest and posttest results. Paired t-tests were also used in Seoul to compare changes based on different time points during the pandemic using the same samples that participated in both surveys. The analysis included items related to the perception of utilizing urban spaces, preferences for leisure and tourism facilities, and the economic impact of the pandemic.

Subsequently, we conducted three rounds of interviews with five local experts, including one urban planning expert residing in Shanghai, one leisure tourism expert residing in Seoul, and three urban planning experts residing in Seoul. The purpose of the interview was to complement the quantitative analysis by capturing the nuanced urban characteristics during the COVID-19 pandemic. This qualitative approach aimed to provide a deeper interpretation of the analysis results that might not be fully elucidated by quantitative methods alone. Notably, peer review was incorporated into the interview process to validate the validity and reliability of the analysis results. The interview questions were primarily open-ended and related to qualitative research items, allowing the experts to freely share their opinions and experiences. The interviews were conducted via online video conferences, and the interview contents were transcribed and integrated into the interpretation of the results.

## IV. Results

### 1. Risk Perception on Infection Disease

#### 1) Assessment of the Impact of the Pandemic

Analysis results presented in <Table 2> reveal comparable perceptions of safety between citizens of Seoul (SE: 62.67) and Shanghai (SH: 65.24). However, Shanghai residents

exhibited heightened awareness of the pandemic's impact, with t-test analysis confirming significant differences in specific items. When comparing average values, both cities recognized the pandemic's influence on safety in daily life, the urban environment, health care access, and social activities. Shanghai, in particular, perceived a more profound impact on social activities (SE: 66.60, SH: 75.14) and the urban environment (SE: 48.87, SH: 83.14).

Satisfaction levels with social relationship maintenance varied markedly between Seoul (46.67) and Shanghai (80.92). This can be traced back to Shanghai's stringent mobility restrictions and its centralized quarantine strategies. While Seoul adopted adaptive policies in line with COVID-19 transmission trends, Shanghai enforced rigorous measures, relaxing them only temporarily. China's larger governmental structure allows for well-coordinated, swift policy implementation tailored to transmission patterns. Recognizing the importance of minimizing physical interaction to prevent disease spread, China's centralized approach effectively reduced interpersonal contact, aiding in epidemic control. This centralized model was further solidified during the pandemic, with China enhancing state intervention in societal and economic spheres in response to COVID-19.

#### 2) Perception of Infectious Disease and Its Countermeasures

Perceptions of infectious diseases and measures taken to prevent their spread show significant variations among cities. The perception of the risk associated with infectious diseases and negative perceptions related to them (e.g., excessive reaction to COVID-19 (2-1), economic damage from COVID-19 policies (2-2) were higher in Shanghai (2-1: 48.91, 2-2: 63.02) compared to Seoul (2-1: 32.67, 2-2: 63.02), indicating substantial differences between cities.

#### 3) Personal Preventive Behaviors Regarding Infectious Diseases

The residents of both cities showed relatively proactive behavior regarding preventive measures. However, there were significant differences between Shanghai and Seoul in terms of mobility to different areas (3-1). Shanghai (79.54) exhibited a higher level of mobility compared to Seoul (75.47), indicating a notable disparity. On the other hand, Seoul displayed more active engagement in behaviors such as avoiding to visit multiple-use facilities (3-2), refraining



**Table 2.** Results of the analysis: Risk perception on infection disease

Items no.	Items	Cities	Average points	Std. Err	Pr> t	Comparison
<b>1. Risk perception on infection disease</b>						
<b>1) Assessment of the impact of the pandemic</b>						
1_1	Impacts on daily safety	Seoul	62.670	0.877	0.540	SE=SH
		Shanghai	65.240	1.006		
1_2	Impacts on urban area (physical environment)	Seoul	48.870	1.180	0.000	SE<SH
		Shanghai	83.140	0.755		
1_3	Access to health care	Seoul	48.330	1.058	0.000	SE<SH
		Shanghai	61.410	0.944		
1_4	Social activity	Seoul	66.600	0.940	0.000	SE<SH
		Shanghai	75.140	0.841		
1_5	Satisfaction with maintaining social relationships	Seoul	46.470	0.985	0.000	SE<SH
		Shanghai	80.920	0.787		
<b>2) Perception of infectious disease and its countermeasures</b>						
2_1	Excessive reaction to COVID-19	Seoul	32.670	1.325	0.000	SE<SH
		Shanghai	48.910	0.929		
2_2	Economic damage from COVID-19 policies	Seoul	37.930	1.216	0.000	SE<SH
		Shanghai	63.020	0.916		
<b>3) Personal preventive behaviors regarding infectious diseases</b>						
3_1	Avoiding visiting different region/cities/area.	Seoul	75.470	1.221	0.008	SE<SH
		Shanghai	79.540	0.934		
3_2	Avoiding visiting multi-use facilities	Seoul	80.330	1.131	0.000	SE>SH
		Shanghai	61.760	1.011		
3_3	Refraining outings within the region	Seoul	79.000	1.153	0.002	SE>SH
		Shanghai	74.030	0.983		
3_4	Avoiding gatherings of large groups	Seoul	83.600	1.161	0.000	SE>SH
		Shanghai	72.930	0.894		

Note: For a better understanding of the paper, we have the visualizations at the link below  
[https://docs.google.com/document/d/1DMiigSgx9nDA06G2\\_ZZDOzKVv7icUa7ojLapXeavneY/edit?usp=sharing](https://docs.google.com/document/d/1DMiigSgx9nDA06G2_ZZDOzKVv7icUa7ojLapXeavneY/edit?usp=sharing)

from outings within the region (3-3), and avoiding gatherings of large groups (3-4) compared to Shanghai.

## 2. Perception and Behavioral Changes in Urban Spaces

### 1) Subjective Assessment of Urban Safety

Residents of Seoul and Shanghai largely perceived their cities as safe during the pandemic (Table 3). However, the t-test results revealed a significant difference emerged in these perceptions, with Shanghai residents (mean = 84.17) feeling safer than those in Seoul (58.93). While Seoul struggled with mass infections in multi-use facilities, Shanghai

residents felt their urban spaces were comparatively safer.

There are two primary reasons for this disparity. Firstly, it is believed that people's mobility within the city was significantly reduced due to strict travel restrictions imposed in Shanghai. Secondly, the forced closure and lockdown of multi-use facilities in Shanghai greatly limited the opportunities for their reuse, effectively reducing the potential for transmission in such spaces.

### 2) Urban Areas' Vulnerability towards the Spread of Infectious Diseases

The vulnerability assessment of urban spaces regarding the spread of infectious diseases highlighted several urban

**Table 3.** Results of the analysis: Perception and behavioral changes in urban spaces

Items no.	Items	Cities	Average points	Std. Err	Pr> t	Comparison
<b>2. Perception and behavioral changes in urban spaces</b>						
<b>1) Subjective assessment of urban safety</b>						
4	Subjective assessment of urban safety	Seoul	58.930	0.993	0.000	SE<SH
		Shanghai	84.170	0.618		
<b>2) Urban area's vulnerability towards the spread of infectious diseases</b>						
5_1	High population density	Seoul	25.970	1.590	0.000	SE<SH
		Shanghai	35.520	1.647		
5_3	High traffic volume	Seoul	36.670	1.430	0.000	SE=SH
		Shanghai	40.580	1.415		
5_4	High pedestrian and bicycle traffic	Seoul	35.930	1.422	0.000	SE<SH
		Shanghai	42.730	1.266		
5_5	Abundance of shared facilities	Seoul	29.970	1.503	0.000	SE<SH
		Shanghai	42.450	1.350		
<b>3) Comparison of perception differences regarding urban spaces (Past-Present)</b>						
6_1	Office facilities	Seoul	29.770	32.266	0.714	SE=SH
		Shanghai	30.640	33.286		
6_2	Medical facilities	Seoul	23.500	33.031	0.470	SE=SH
		Shanghai	25.480	40.231		
6_3	Shopping center	Seoul	42.170	34.703	0.616	SE=SH
		Shanghai	40.820	38.306		
6_4	Restaurants	Seoul	41.670	33.947	0.987	SE=SH
		Shanghai	41.730	38.279		
6_5	Entertainment facilities (clubs and bars)	Seoul	41.000	34.675	0.855	SE=SH
		Shanghai	41.490	38.491		
6_6	Cultural facilities	Seoul	39.130	33.371	0.010	SE>SH
		Shanghai	32.740	34.634		
6_7	Indoor sport facilities	Seoul	42.500	35.188	0.084	SE=SH
		Shanghai	38.000	36.300		
6_8	Outdoor sport facilities	Seoul	32.830	31.223	0.013	SE>SH
		Shanghai	26.770	35.192		
6_9	Sanitary facilities	Seoul	46.470	34.547	0.002	SE>SH
		Shanghai	38.100	37.371		
6_10	Religious facilities	Seoul	37.330	28.839	0.000	SE>SH
		Shanghai	25.910	33.482		
6_11	Public facilities	Seoul	23.170	29.584	0.000	SE<SH
		Shanghai	31.930	36.139		
6_12	Green spaces and open spaces	Seoul	20.433	29.986	0.025	SE<SH
		Shanghai	25.359	30.317		

Note: For a better understanding of the paper, we have the visualizations at the link below

[https://docs.google.com/document/d/1DMiigSgx9nDA06G2\\_ZZDOzKVv7icJa7ojLapXeavneY/edit?usp=sharing](https://docs.google.com/document/d/1DMiigSgx9nDA06G2_ZZDOzKVv7icJa7ojLapXeavneY/edit?usp=sharing)

characteristics. Notably, “high population density”, “high traffic volume (vehicle movement)”, “high pedestrian and bicycle traffic”, and “abundance of shared facilities (shared offices, shared transportation, etc.)” were perceived to have an impact on the spread of infectious diseases. In particular, “high population density (SE: 25.97, SH: 35.52)” and “abundance of shared facilities (SE: 29.97, SH: 42.95)” were seen as having major effects, with lower values indicating greater vulnerability. Between the two cities, Seoul showed a higher perception of the impact of urban spatial factors on disease spread compared to Shanghai, indicating a significant difference between the cities.

### 3) Comparison of Perception Differences Regarding Urban Spaces

Seoul and Shanghai differed significantly in their perceptions of urban spaces from pre-pandemic to the pandemic, with a more positive perception before the outbreak. T-tests comparing the shifts in urban spaces between the two cities showed no significant changes for offices, medical, shopping centers, restaurants, entertainment facilities (clubs and bars), and indoor sports facilities. However, cultural (SE: 39.13, SH: 32.74), outdoor sports (SE: 32.83, SH: 26.77), sanitary (SE: 46.47, SH: 38.10), and religious facilities (SE: 37.33, SH: 25.91) revealed marked regional differences. Seoul perceived a greater decline in favorability towards these urban spaces than Shanghai. Conversely, public facilities (SE: 23.17, SH: 31.93) and green spaces and open spaces (SE: 20.43, SH: 25.36) had greater perception shifts in Shanghai. However, green spaces and open spaces remained relatively stable in perception across both cities.

### 4) Perception Differences Regarding Urban Spaces in Seoul at Different Time Points

The analysis of responses to identical items in the first and second phases conducted in Seoul revealed that the perception of restaurant, cultural facilities, indoor sports facilities, religious facilities, public facilities, and green spaces and open spaces usage significantly increased in the second phase compared to the first phase (Table 4).

This indicates a more positive perception of space utilization during the second phase, whereas the first phase exhibited a significantly higher negative perception of space utilization. Specifically, the perception of green spaces and open

spaces usage increased by approximately five-fold in the second phase compared to the first phase. Additionally, perception of office facilities, educational facilities, medical facilities, shopping centers, entertainment facilities, outdoor sports facilities, and sanitary facilities utilization had significant differences between the first and second phases.

## 3. Leisure and Tourism

### 1) Satisfaction with Leisure and Tourism

Satisfaction with leisure activities and tourism was compared between Seoul and Shanghai (Table 5). The results of the comparison between different time points showed a significant difference in the satisfaction level of leisure and tourism activities before and after the pandemic, with higher satisfaction levels observed before the outbreak. Analyzing the changes between time points (past - present), Seoul (74.93 (past) → 44.20 (present)) exhibited a larger decrease in satisfaction compared to Shanghai (76.25 → 51.43), indicating a significant difference between the two cities.

### 2) Preference for Leisure Activities

Comparing pre-pandemic and during-pandemic leisure preferences in Seoul and Shanghai, both cities favored remote-based activities like online leisure and shopping more during the pandemic. However, there was also a notable increase in preferences for indoor and outdoor leisure, shopping, religious activities, and family visits during the pandemic, highlighting significant shifts over the time points. Analyzing the changes between the past and current time points in each city, Seoul displayed a stronger shift towards remote-based leisure activities than Shanghai, with notable increases in online leisure (0.13) and shopping (0.15).

### 3) Changes in Preferences for Tourist Destinations Selection

The changes in preference for tourist destination selection between the past and the present are as follows. In Seoul, there has been a significant increase in preference for safe places and places with fewer visitors compared to the past. On the other hand, Shanghai showed a higher preference in the current period compared to the past for safe places, places with fewer visitors, the recognition of tourist sites, and cleanliness and hygiene conditions.

**Table 4.** Results of the analysis: Perception and behavioral changes in urban spaces (in case of Seoul)

Items no.	Items	Phase	Average points	Std. Err	Pr> t	Comparison
<b>2. Perception and behavioral changes in urban spaces</b>						
<b>4) Perception differences Regarding Urban spaces in Seoul at different time points (First-Second)</b>						
7_1	Office facilities	First	-1.41	0.118	0.007	First > Second
		Second	-1.52	0.133		
7_2	Medical facilities	First	-0.50	0.131	0.008	First < Second
		Second	-0.35	0.162		
7_3	Shopping center	First	-2.36	0.126	0.000	First < Second
		Second	-2.24	0.125		
7_4	Restaurants	First	-2.62	0.121	0.000	First < Second
		Second	-2.10	0.127		
7_5	Entertainment facilities (clubs and bars)	First	-3.76	0.122	0.000	First < Second
		Second	-3.57	0.121		
7_6	Cultural facilities	First	-2.55	0.119	0.001	First < Second
		Second	-1.67	0.128		
7_7	Indoor sport facilities	First	-2.86	0.128	0.000	First < Second
		Second	-2.36	0.128		
7_8	Outdoor sport facilities	First	-1.67	0.125	0.018	First < Second
		Second	-1.43	0.124		
7_9	Sanitary facilities	First	-3.28	0.125	0.000	First < Second
		Second	-3.20	0.118		
7_10	Religious facilities	First	-3.89	0.118	0.000	First < Second
		Second	-3.24	0.125		
7_11	Public facilities	First	-1.52	0.121	0.002	First < Second
		Second	-0.83	0.127		
7_12	Green spaces and open spaces	First	0.087	0.129	0.000	First < Second
		Second	0.55	0.164		

Note: For a better understanding of the paper, we have the visualizations at the link below

[https://docs.google.com/document/d/1DMiigSgx9nDA06G2\\_ZZDOzKvV7icJa7ojLapXeavneY/edit?usp=sharing](https://docs.google.com/document/d/1DMiigSgx9nDA06G2_ZZDOzKvV7icJa7ojLapXeavneY/edit?usp=sharing)

In the past, preferences for attractions, atmosphere, scenery and surroundings, affordability, and the recognition of tourist sites were higher in Seoul. However, in the present, preferences for cleanliness and hygiene conditions and safe places with fewer visitors have become more prominent. Similar changes are observed in Shanghai, where preferences for attractions, natural environment, atmosphere, scenery and surroundings, and affordability were higher in the past compared to the present.

Analyzing the changes between the past and the present, it is evident that preferences for cleanliness and hygiene conditions and safe places with fewer visitors have increased in the

present compared to the past. The largest change is seen in the preference for places with fewer visitors, with a decrease of -12.33 points in Seoul and -19.55 points in Shanghai.

When comparing Seoul and Shanghai, it is observed that Shanghai shows larger changes in preferences for cleanliness and hygiene conditions and places with fewer visitors compared to Seoul, indicating an increased preference in the current period compared to the past. On the other hand, Seoul shows a larger change in preferences for excellent facilities and well-known tourist sites compared to Shanghai, with these preferences being higher in the past than at present.

**Table 5.** Results of the analysis: Leisure and tourism

Items no.	Items	Cities	Average points	Std. Err	Pr> t	Comparison
<b>3. Leisure and tourism</b>						
<b>1) Satisfaction with leisure and tourism (Past-Present)</b>						
8	Satisfaction with leisure and tourism	Seoul	-0.41	0.21	0.000	SE<SH
		Shanghai	-0.33	0.17		
<b>2) Preference for leisure activities (Past-Present)</b>						
9_1	Indoor leisure activities	Seoul	-0.40	0.19	0.00	SE<SH
		Shanghai	-0.25	0.10		
9_2	Outdoor leisure	Seoul	-0.25	0.07	0.00	SE<SH
		Shanghai	-0.23	0.10		
9_3	Outdoor shopping	Seoul	-0.32	-0.03	0.01	SE<SH
		Shanghai	-0.29	0.12		
9_4	Religious activities	Seoul	-0.25	-0.22	0.96	SE=SH
		Shanghai	-0.25	-0.11		
9_5	Visiting family or friends house	Seoul	-0.34	0.01	0.00	SE<SH
		Shanghai	-0.28	0.07		
9_6	Remote online leisure activities	Seoul	0.13	0.11	0.02	SE>SH
		Shanghai	0.06	0.06		
9_7	Online shopping	Seoul	0.15	0.10	0.00	SE>SH
		Shanghai	0.03	0.08		
<b>3) Changes in preferences for tourist destinations selection</b>						
10_1	Transportation accessibility	Seoul	2.47	1.308	0.163	SE=SH
		Shanghai	0.10	1.044		
10_2	Recreational activities	Seoul	8.37	1.338	0.738	SE=SH
		Shanghai	7.79	1.048		
10_3	Natural environment	Seoul	1.50	1.244	0.321	SE=SH
		Shanghai	3.11	0.996		
10_4	Sanitation and hygiene conditions	Seoul	-2.03	1.140	0.001	SE>SH
		Shanghai	-7.46	1.091		
10_5	Convenient facilities	Seoul	2.13	1.082	0.018	SE>SH
		Shanghai	-1.63	1.030		
10_6	Quality of services	Seoul	1.83	1.148	0.707	SE=SH
		Shanghai	1.20	1.105		
		Shanghai	1.20	1.105		
10_7	Safety	Seoul	-2.40	1.199	0.463	SE=SH
		Shanghai	-3.54	0.949		
10_8	Atmosphere	Seoul	3.67	1.152	0.163	SE=SH
		Shanghai	6.02	1.093		
10_9	The scenery and surrounding landscapes	Seoul	3.73	1.184	0.874	SE=SH
		Shanghai	3.49	0.948		
10_10	Place with fewer visitors	Seoul	-12.33	1.402	0.000	SE<SH
		Shanghai	-19.55	1.446		
10_11	Affordability	Seoul	3.07	1.101	0.546	SE=SH
		Shanghai	2.10	1.031		
10_12	High tourist recognition	Seoul	9.87	1.383	0.000	SE>SH
		Shanghai	-4.59	1.180		

Note: For a better understanding of the paper, we have the visualizations at the link below  
[https://docs.google.com/document/d/1DMiigSgx9nDA06G2\\_ZZDOzKVv7icUa7ojLapXeavneY/edit?usp=sharing](https://docs.google.com/document/d/1DMiigSgx9nDA06G2_ZZDOzKVv7icUa7ojLapXeavneY/edit?usp=sharing)

In the analysis of the first and second phases conducted in Seoul, it is found that preferences significantly increased in most items in the second phase compared to the first phase when selecting tourist destinations. Particularly, preferences for attractions and natural environment, affordability, and places with fewer visitors more than doubled in the second phase compared to the first phase, indicating significant differences between the time points.

#### 4. Community

Regarding the change in the sense of community during the pandemic, the frequency of conflicts with family and neighbors was reduced in Shanghai compared to before COVID-19, with scores of 47.53 points and 42.91 points, respectively, out of 100 points (where 50 points indicate no change before and after the pandemic). In Seoul, family conflicts increased, while neighborhood conflicts remained at a similar level, with scores of 53.61 and 50.53, respectively. Both family and neighbor conflicts showed statistically significant differences between Seoul and Shanghai. However, the nature of these differences was distinct. Family conflicts decreased in Shanghai and increased in Seoul, resulting in a statistically significant difference between the two cities. The difference in neighbor conflicts was because they decreased in Shanghai and persisted in Seoul. In terms of dissatisfaction with social relationships, such as family and neighbors, measured through reverse scaling of the original satisfaction item, Seoul scored 55.93 points, while Shanghai scored 67.84 points, indicating an increase in dissatisfaction in both cities. However, the degree of aggravation was significantly greater in Shanghai.

#### 5. Economic Impact of COVID-19 on Household Income

Regarding the pandemic's economic impact, both Seoul and Shanghai reported a similar average on household income effects, scoring between 66-68 points, highlighting parallel economic strains in both cities. When analyzing Seoul's data across two time frames, a significant difference was observed: the initial phase showed a greater impact on household income (70.56) than the latter (54.34) (Table 6). The prolonged implementation of intense disease control

measures in Shanghai caused economic setbacks (Bai et al., 2022). The city experienced a 2.3% decrease in GDP in 2020 compared to the previous year. Despite witnessing an 8.1% increase in 2021, its GDP did not reach pre-pandemic levels. In contrast, Seoul's GDP contracted by only 1% in 2020 and subsequently expanded by 4.1% in 2021. This difference highlights the more pronounced economic impact of the pandemic in Shanghai compared to Seoul.

The pandemic prompted a consumption shift, with a decrease in physical shopping venues like marts, malls, and local stores, in favor of online alternatives. This was especially pronounced in Shanghai, reflecting the constraints of travel restrictions. In Seoul, the ranking for shopping preferences was: traditional markets (42.80), local stores (50.33), large marts (52.33), delivery platforms (70.33), and online shopping (75.50). In contrast, Shanghai's preferences were: traditional markets (44.02), large marts (50.33), local stores (51.00), delivery platforms (78.15), and online shopping (83.08). Notably, Shanghai demonstrated a stronger pivot towards online consumption during the pandemic than Seoul.

## V. Discussion

This study compared perceptions and behaviors of urban residents during the COVID-19 pandemic in Seoul and Shanghai—two prominent megacities in East Asian with similar geographical characteristics. The primary aim was assess and compare these dimensions quantitatively. Significant differences in perceptions and behaviors were found between the cities, with Shanghai residents perceiving a stronger impact due to stricter COVID-19 prevention measures.

Both cities' residents acknowledged the profound influence of the pandemic on daily life, especially on social activities and physical environment. Notably, Shanghai residents perceived a more substantial impact than those in Seoul. This variance can be contextualized by examining the inherent nature of COVID-19 as a respiratory disease and the respective disease prevention strategies implemented. WHO (2020) has emphasized preventive measures like mask-wearing, avoiding crowded places, and highlighted the risk in enclosed spaces with poorly ventilated; leading to advice for people to stay at home and restriction on

**Table 6.** Results of the analysis: Community, Economic impact of COVID-19 on household income

Items no.	Items	Cities	Average points	Std. Err	Pr> t	Comparison
<b>4. Community</b>						
11_1	Conflicts with family	Seoul	-2.40	1.199	0.463	SE=SH
		Shanghai	-3.54	0.949		
11_2	Conflict with friends	Seoul	3.67	1.152	0.163	SE=SH
		Shanghai	6.02	1.093		
<b>5. Economic impact of COVID-19 on household income</b>						
<b>1) Impact on household income</b>						
12_1	Impact on household income (Cities)	Seoul	66.33	1.258	0.341	SE=SH
		Shanghai	67.76	0.878		
12_2	Impact on household income (Seoul: phase)	First	70.56	1.158	0.000	First > Second
		Second	54.34	1.185		
<b>2) Changes in consumer behavior</b>						
13_1	Large marts, department store, complex shopping mall	Seoul	52.33	1.407	0.000	SE>SH
		Shanghai	50.33	1.232		
13_2	Local store	Seoul	50.33	1.232	0.000	SE<SH
		Shanghai	51.00	1.160		
13_3	Traditional market places	Seoul	42.80	1.345	0.000	SE>SH
		Shanghai	44.02	1.232		
13_4	Online shopping	Seoul	75.50	1.107	0.000	SE<SH
		Shanghai	83.08	0.846		
13_5	Online delivery service	Seoul	70.33	1.183	0.000	SE<SH
		Shanghai	78.15	1.044		

Note: For a better understanding of the paper, we have the visualizations at the link below  
[https://docs.google.com/document/d/1DMiigSgx9nDA06G2\\_ZZDOzKVV7icUa7oJLapXeavneY/edit?usp=sharing](https://docs.google.com/document/d/1DMiigSgx9nDA06G2_ZZDOzKVV7icUa7oJLapXeavneY/edit?usp=sharing)

multi-purpose facilities. Large outbreaks occurred in enclosed spaces such as cafes, restaurants, and indoor sports facilities, where mask-wearing or distancing is challenging. Responding to these risks, Shanghai adopted more rigorous prevention protocols than Seoul, including comprehensive restrictions on movement and closing non-essential facilities. From a behavioral economics perspective, complete access restrictions, as observed in Shanghai, tend to amplify the perception of impact. Prospect Theory suggests people exhibit greater sensitivity to losses more acutely than gains (Haines et al., 2018). Hence, stringent access restrictions, like those in Shanghai, can amplify the impact of the pandemic more strongly.

This study unveiled a high awareness in both cities about population density and shared facilities affecting disease spread. Notably, Seoul exhibited a stronger association

between urban characteristics and disease transmission compared to Shanghai, indicating a notable disparity between the two cities. Seoul had a stronger link between city traits and disease spread than Shanghai due to Seoul's much higher density (15,550 people/km<sup>2</sup>) compared to Shanghai (3,900 people/km<sup>2</sup>). While Seoul is smaller in population and size than Shanghai, its heightened density makes it more vulnerable to COVID-19 transmission (Bhadra et al., 2021; WHO, 2020), thereby influencing perceptions.

Conversely, Shanghai's urban growth was decentralized and dispersed, with multiple smaller centers, reducing dense areas and offering more urban spaces (Zhang et al., 2019). Shanghai residents felt shared facilities didn't directly spread diseases, possibly due to strict measures against them. This, in contrast to Seoul, where such facilities remained

open, could explain Shanghai's lower perceived risk.

Both cities had increased disease risk perception, but Shanghai had a higher fear level than Seoul. Shanghai had stricter control measures. Shanghai was more concerned about personal transmission, while Seoul's government policy was generally seen favorably. Shanghai had an unfavorable perception of government policy, possibly due to its prolonged and strict nature.

Following the survey, protests against the Chinese central government's high-intensity zero-COVID-19 policy occurred in major cities such as Shanghai, Beijing, and Guangzhou (Holbig, 2023; Lyu et al., 2023). As a result, in December 2022, the Chinese government eased the lockdown measures in major cities and resumed the operation of multi-purpose facilities in low-risk areas, improving certain policies (Hankyoreh, 2022/12/01). On the other hand, in Seoul, the Korea Disease Control and Prevention Agency shared daily updates on the spread of infectious diseases, highlighting the effectiveness of social distancing measures through campaigns like "Thanks to You Challenge (덕분에 챌린지)." It has been shown that these policies and campaigns have a positive impact on individuals' preventive behaviors (e.g., vaccination, personal hygiene) (Kim et al., 2022).

Differences in preventive behaviors greatly impacted individual evaluations. Shanghai was more proactive, avoiding crowded places and staying home, while also canceling travel plans. In contrast, Seoul residents opted for alternative travel rather than canceling trips. Initially, in 2021, there was a trend of canceling trips and staying home, but by 2022, domestic travel surged with a 46% accommodation revenue increase (Techworld, 2022/01/27).

Shanghai had stricter travel restrictions, while Seoul adapted measures based on transmission trends. Thus, Seoul residents were more conscious of non-participation and more aware of their compliance with guidelines. Shanghai was safer than Seoul during COVID-19. Multi-use spaces spread diseases; masks while eating are risky (Arashiro et al., 2022). Despite distancing rules, transmission risk persisted indoors, requiring visitor perception understanding. Shanghai enforced strict policies, limiting facility hours, promoting remote work, and closing high-risk venues. Medium-risk places offered take-out until January 2023.

This study found higher risk perception in indoor spaces (e.g., restaurants, entertainment venues) due to poor venti-

lation. Green areas were considered safe. Urban spaces saw little change before the pandemic. Seoul saw more green space interest. Studies in Shanghai (Zhang et al., 2023) and Seoul (Heo et al., 2021) showed green spaces reduce depression. Green spaces offer alternatives for indoor activities during pandemics. People preferred outdoor activities for social distancing, given the emphasis on medical facility access.

In addition, Seoul and Shanghai faced pandemic-related challenges about leisure and tourism, affecting resident satisfaction. Seoul had smaller changes in indoor leisure and visiting friends compared to Shanghai, showing intercity differences. Seoul had more significant shifts in remote leisure activities. We analyzed pre-and post-pandemic leisure activity frequencies in both cities.

Overall, if an activity was more common before, it tended to continue during the pandemic, with exceptions. Seoul had more indoor leisure activities pre-pandemic, but Shanghai had more during it. Both cities saw reductions, but Seoul's decrease was larger due to various factors. The survey focused on perception, with Shanghai citizens possibly not seeing the drop as significant. Seoul restricted non-mandatory activities, impacting citizens' perception of indoor leisure. Differences in the definition of "indoor leisure activities" may also have contributed, as Seoul linked them to outside activities, while Shanghai included home-based ones.

In summary, Seoul and Shanghai didn't significantly differ in perceived leisure activities, except due to comprehensive (Shanghai) or selective (Seoul) restrictions. Targeted restrictions led to stronger perceived limits on behaviors. Regarding tourist facility preferences, both cities showed increased awareness of COVID-19 transmission control. They favored safety and fewer visitors. Shanghai had a greater shift toward 'cleanliness and low visitors' post-pandemic, now statistically similar to Seoul's preference, which was higher before the pandemic.

Before COVID-19, Seoul had higher hygiene expectations than Shanghai. During the pandemic, both cities stressed preventive measures like handwashing, masks, and distancing. Seoul focused on personal hygiene with hand sanitizers, disinfection, and mask penalties. Shanghai emphasized cleanliness, leading to disease transmission concerns. Urban precautions reduce perceived risks (Zhong et al., 2021).



Shanghai saw increased domestic tourism awareness due to border closures (Huang et al., 2021).

Seoul saw a notable shift in tourist facility preferences during the pandemic, favoring natural and less crowded places in the second phase, reflecting a pandemic-related learning effect (Korea Tourism Organization, 2021). In Shanghai, conflicts with close individuals decreased, possibly due to strict government lockdowns. During the expert interviews, it was observed that community cooperation became crucial during the lockdown period, as community access was prohibited. Quoting Interviewee A directly:

*“Each apartment building has WeChat (a social networking platform). During the pandemic, if there were any complaints or improvement suggestions, the management office would collect and relay them to the local government for sharing. Additionally, with the prohibition of community access, there was an increase in collaborative activities among residents, such as picking up delivery items in designated areas within the apartment complex.”*

Furthermore, according to the China Population Census Yearbook (2020), Shanghai has 30.58m<sup>2</sup> per person, while Seoul has 26.6m<sup>2</sup> (Statistics Korea, 2021). Residential area per person and population density affect stress (Chan et al., 2020) and household conflicts. In Seoul, more time at home and family contact increased conflict potential and reduced relationship satisfaction. Social relationships can have both positive and negative effects. Trust levels in Shanghai and Seoul remained consistent: family, friends, neighbors, foreigners, and strangers, unaffected by the pandemic.

## VI. Conclusions

This study examines differences in the perceptions and behaviors of urban residents in Seoul and Shanghai, both major East Asian megacities and economic hubs, in response to the pandemic. The research highlights the role of factors such as population density, urban distribution patterns (e.g., polycentricity), and cultural characteristics in shaping individual responses during the pandemic, leading to variations between the two cities.

A main finding is the significant impact of COVID-19 control policies on individuals' perceptions and their views of their respective cities. South Korea's decentralized approach emphasizes individual responsibility and behavior that doesn't harm others, while China adopted a centralized

strategy, involving close cooperation between central and local authorities, enforcing strict urban activity restrictions. Gradual control measures prove more effective in raising awareness of spatial risks compared to complete lockdowns. However, overly stringent policies can negatively affect the economy, potentially harming urban residents.

Considering the potential fatigue and drawbacks of sustained intense policies, finding a balanced approach is essential. During the pandemic, there was a negative shift in perceptions of urban space utilization compared to pre-pandemic times. Nonetheless, open green spaces continued to receive positive evaluations, even under behavior-restricting policies. Given the positive impact of green spaces on mental and physical health, addressing infectious disease transmission in the future is critical. Moreover, infectious diseases significantly influenced individuals' leisure activities and choice of tourist destinations, underscoring the meaningful impact of personal hygiene policies. Shanghai, for instance, demonstrated higher hygiene considerations compared to regions with strict personal hygiene policies like Seoul.

Finally, to clarify how the effects of the pandemic differ based on national and city characteristics, it is necessary to expand the research to other Asian megacities with similar urban characteristics, such as Tokyo, Singapore, and Taipei. This would allow for a comparative analysis and a better understanding of the varied impacts of the pandemic. In future research, it is necessary to analyze the impact of city structure and demographic and socioeconomic characteristics by comparing changes in cities with similar quarantine policies and enforcement structures following the infectious disease.

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