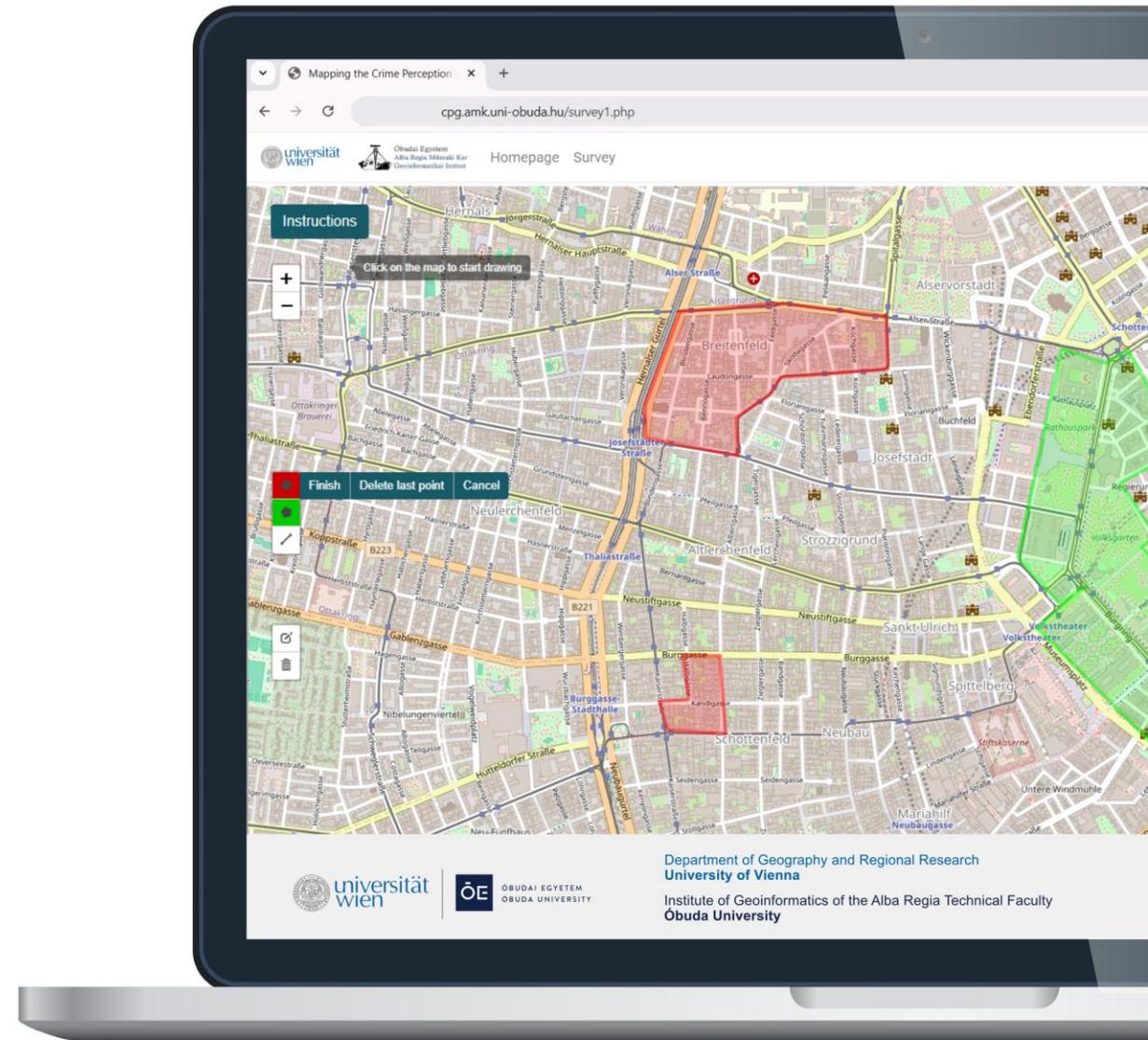# Mapping and modeling the crime perception gap

Joint Project Austria and Hungary

Austrian Science Fund & National Research Development and Innovation Office Hungary

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Methodological note

The results presented in this booklet are based on a non-probabilistic sample and are therefore not statistically representative of the general population in Budapest or Vienna. As such, the findings should not be interpreted as definitive or conclusive reflection of the perception of the society in either city. Nevertheless, the data collected provides insights into how participants perceive safe and unsafe areas in their urban environment. These findings serve as a meaningful starting point for further research and discussion on spatial perceptions of safety. The information presented should be approached with caution and understood as an exploratory contribution rather than a comprehensive or generalizable conclusion.

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Introduction

This research project is a collaboration between the Department of Geography and Regional Research at the University of Vienna and the Institute of Geoinformatics at Óbuda University, supported by the Hungarian National Research, Development and Innovation Fund and the Austrian Science Fund (FWF). For more information about the project, visit the **project website**.

The aim is to explore the spatial crime perception gap (SCPG) — the difference between how safe or unsafe people feel in certain areas and the actual crime data. To do so, a geo-questionnaire was used to gather input from residents in Budapest and Vienna, who identified places they perceive as safe or unsafe and provided additional context about those areas.

Perception of crime are shaped by social, demographic, and environmental factors, and may not always reflect reality. Understanding these perception gaps is important, as they influence quality of life, behavior, and spatial dynamics. This study contributes into how residents experience safety in their cities and where mismatches between perception and reality occur.

Methodology

To capture perceptions of crime and safety, a web-based geo-questionnaire was developed and launched as a self-administered **online survey**. The survey was open from November 27, 2023, to February 20, 2024, and targeted residents aged 18 and over living in Budapest or Vienna.

The geo-questionnaire consisted of two parts. In the first, participants were asked to identify areas they perceived as safe or unsafe by drawing polygons on an OpenStreetMap-based web map. Follow-up questions allowed them to describe the characteristics of the areas they marked. The second part included general questions about safety, along with demographic information.

The survey was initially distributed via email using a snowball sampling approach. It was later promoted more broadly through university websites, social media platforms, and physical materials such as posters and flyers placed on campuses and in student dormitories.

The datasets are available in the **Digital Geography GitHub repository**.

Part I

# Crime perception in Budapest, Hungary

1.1 Area of study

Budapest, the capital of Hungary, is divided into 23 districts, each with distinct urban and social characteristics. Geographically, the city is split by the Danube River, forming two main areas: Buda, located on the western side, and Pest, on the eastern side.

As of 2024, Budapest had a population of approximately 1.69 million inhabitants and a population density of 3,211 people per km^2. The city reports a GDP per capita of €42,954, an unemployment rate of 2.6% (2023), and a relatively small proportion of residents with non-Hungarian citizenship (0.62% in 2022).

Budapest has four main railway stations (Keleti, Nyugati, Déli, and Kelenföld), which support both national and international travel. Its public transportation system includes an integrated network of buses, trams, suburban trains, and an underground metro system with four lines.
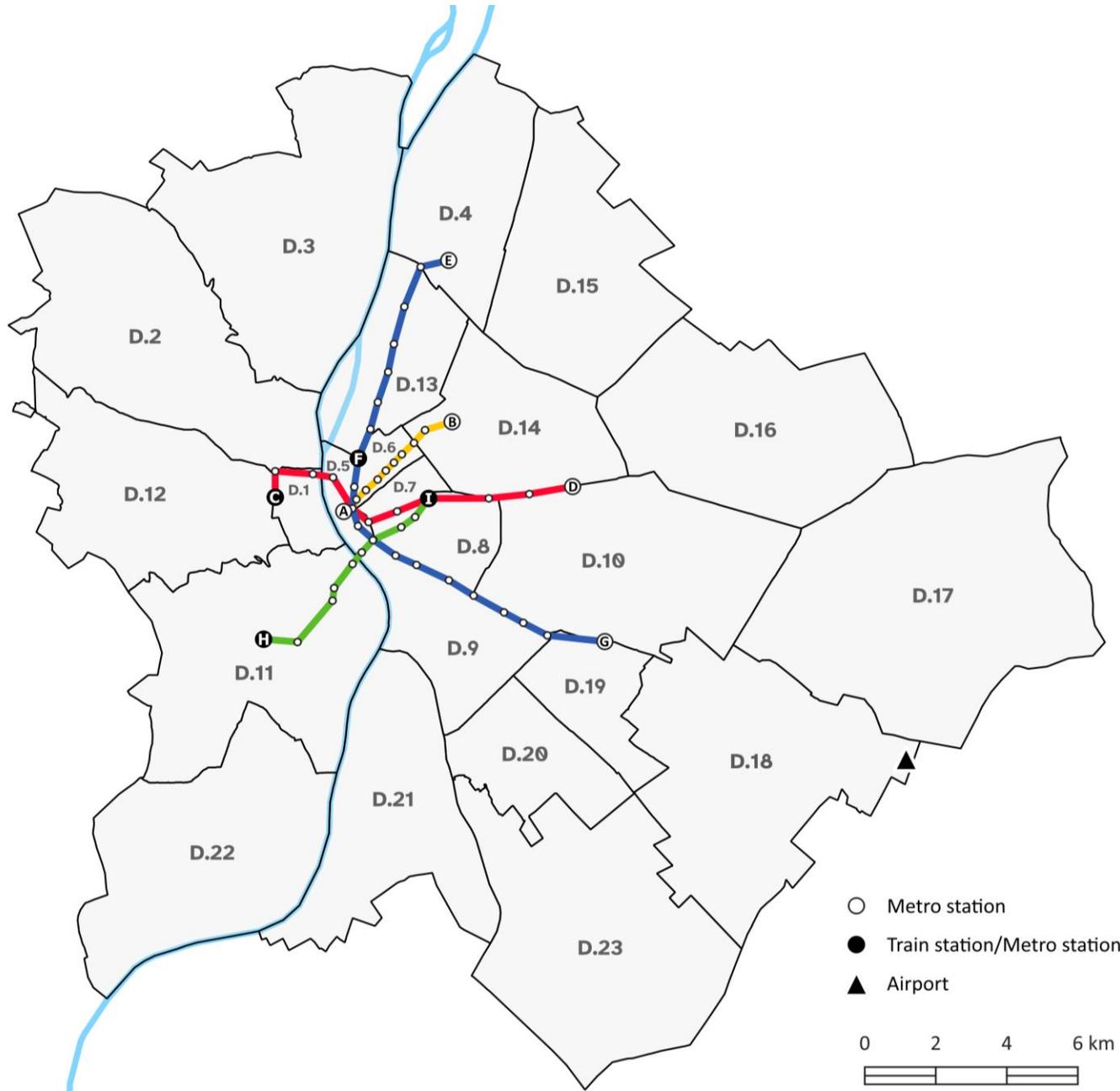
Metro lines and end stations

Metro Line 1

A - Vörösmarty tér

B - Mexikói Út

Metro Line 2

C - Déli (train station)

D - Örs vezér tere

Metro Line 3

E - Újpest-Központ

F - Nyugati (train station)

G - Kőbánya-Kispest

Metro Line 4

H - Kelenföld vasútállomás (train station)

I - Keleti (train station)

○ Metro station

● Train station/Metro station

▲ Airport

0   2   4   6 km

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FWF Austrian Science Fund

NATIONAL RESEARCH, DEVELOPMENT AND INNOVATION OFFICE HUNGARY

1.2 Overall perception of safety

In this section, we present the overall safety perception of participants in Budapest.

To provide a broader perspective on how citizens perceive security in their city, we present maps depicting perceived safe and unsafe areas based on participants' feelings about crime severity and their level of trust in the police.

Content:

- Perceived safe and unsafe areas GO

- Perceived safe and unsafe areas by perceived general crime severity level GO

- Perceived safe and unsafe areas by level of trust in the police GO

1. CRIME PERCEPTION IN **BUDAPEST, HUNGARY**

1.2 Overall perception of safety

Perceived safe and unsafe areas

We collected responses from **533 participants**, who identified **1,453 safe areas** (reported by 488 participants) and **1,678 unsafe areas** (reported by 510 participants) within the city.
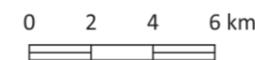
Perceived safe and unsafe areas

Overall perceived **safe** areas

Overall perceived **unsafe** areas

Legend:
- Perceived safe areas
- Perceived unsafe areas
- District boundary
- Metro station Line 1
- Metro station Line 2
- Metro station Line 3
- Metro station Line 4
- Metro station Multi-Line
- Train/Metro station
- Airport
- Metro line

0 2 4 6 km

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FWF Austrian Science Fund

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1. CRIME PERCEPTION IN **BUDAPEST, HUNGARY**

1.2 Overall perception of safety

Perceived safe and unsafe areas by perceived general crime severity level

To gain a broader insight into how residents perceive crime, participants were asked to assess the **overall severity** of criminal activity in the city.

The perceived crime severity graph shows that the majority of participants rated **crime severity in Budapest as moderate** (270 responses), followed by high (121 responses) and low (99 responses).
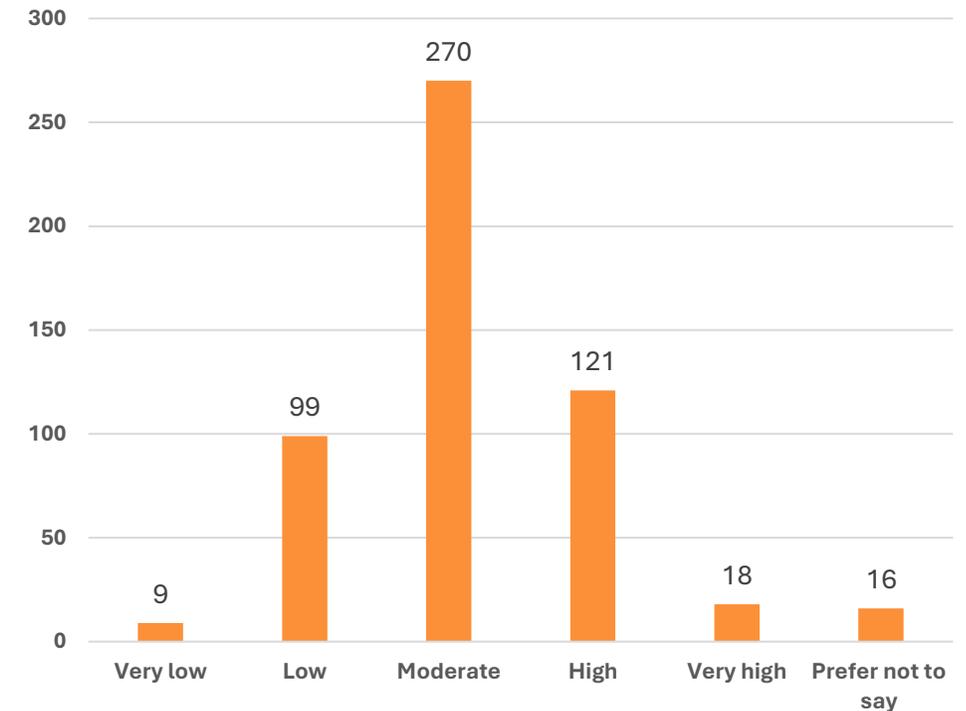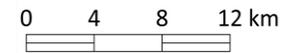
Perceived safe areas by participants' perception of general crime severity in the city

Index

Very low

Low

Moderate

High

Very high

Prefer not to say

Perceived safe areas

District boundary

0   4   8   12 km

Perceived unsafe areas by participants' perception of general crime severity in the city

Index

Very low

Low

Moderate

High

Very high

Prefer not to say

Perceived unsafe areas

District boundary

0   4   8   12 km

1. CRIME PERCEPTION IN **BUDAPEST, HUNGARY**

1.2 Overall perception of safety

Perceived safe and unsafe areas by level of trust in the police

Understanding trust in law enforcement is essential when analyzing perceptions of safety. Participants were asked to rate their level of trust in the police, as this factor can influence how individuals perceive crime and security in their surroundings.

The distribution of responses reveals that most participants reported a **moderate level of trust in the police** (181 responses) in Budapest.
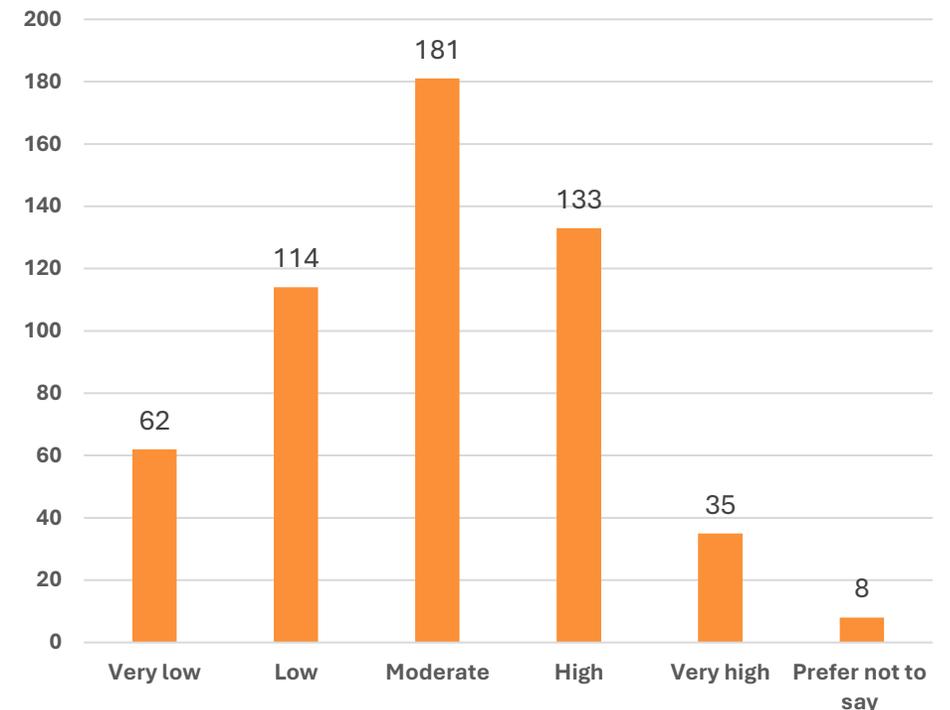
Perceived safe areas sketched by participants based on their level of trust in the police

Index

Low

Very low

Moderate

High

Very high

Prefer not to say

Perceived safe areas

District boundary

0   4   8   12 km

Perceived unsafe areas sketched by participants based on their level of trust in the police

Very low

Low

Moderate

High

Very high

Prefer not to say

Perceived unsafe areas

District boundary

0   4   8   12 km
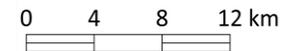
1.3 Personal crime experience and feeling of safety

This section explores how personal experiences with crime and feelings of vulnerability shape perception of safety in Budapest. We compare the responses of participants who have experienced violent or property crimes with those who have not, highlighting differences in the areas they perceive as safe or unsafe. Additionally, we visualize how participants' general feelings of unsafety or vulnerability influence their spatial perception of crime.

Content:

- Perceived safe and unsafe areas by participants with or without previous violent crime experience   GO

- Perceived safe and unsafe areas by participants with or without previous property crime experience   GO

- Perceived safe and unsafe areas according to frequency of insecurity feelings   GO

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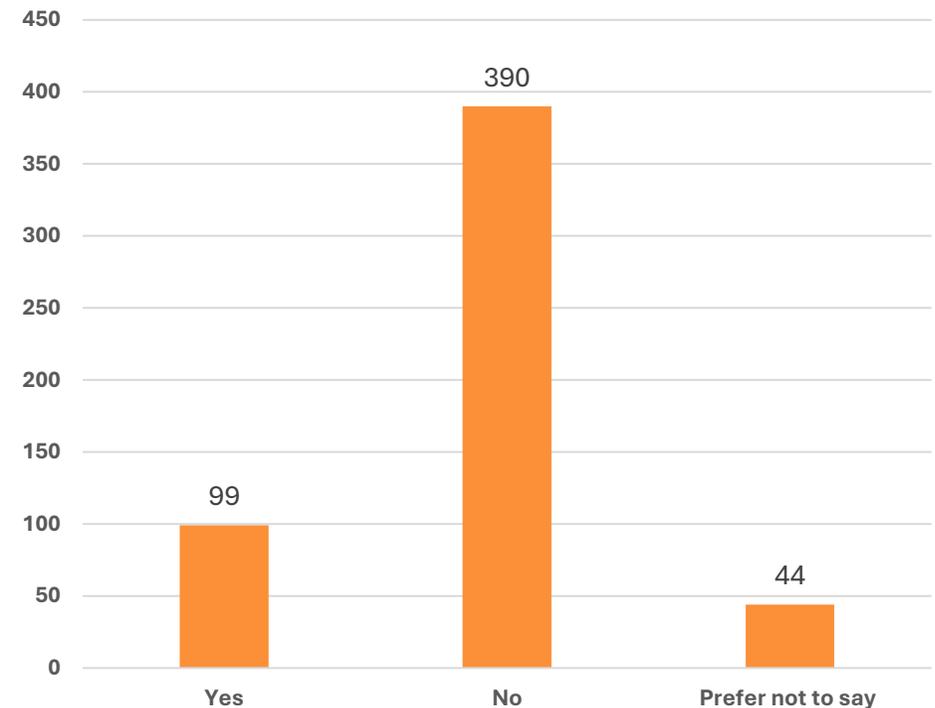
1. CRIME PERCEPTION IN **BUDAPEST, HUNGARY**
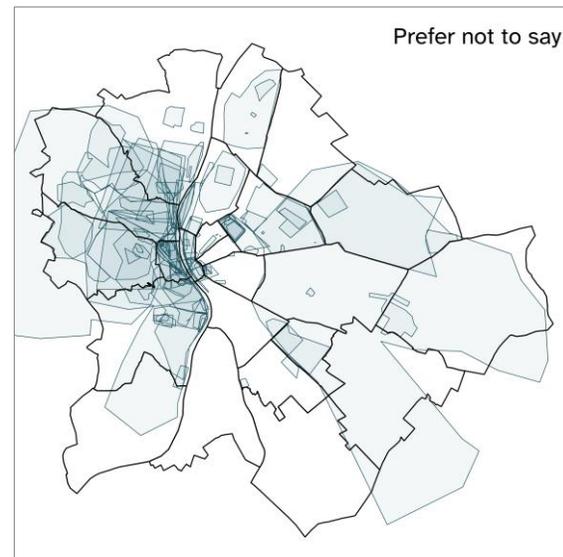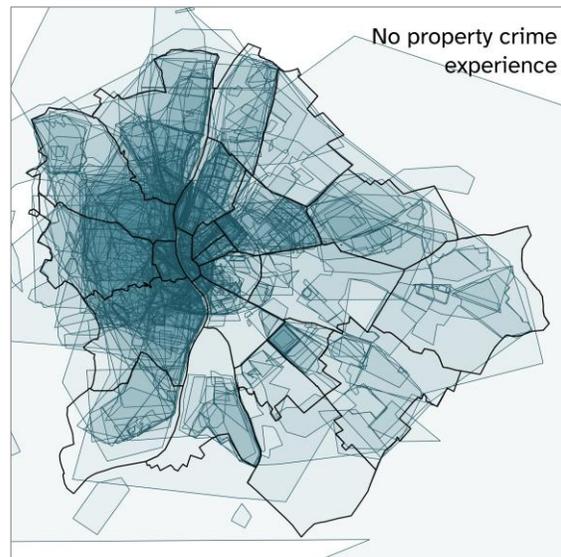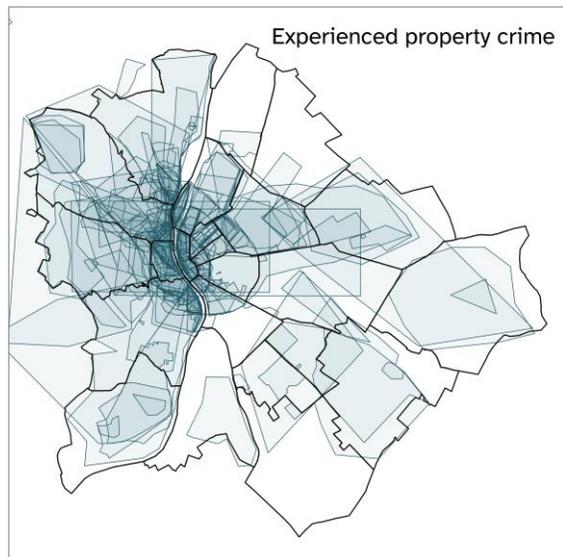
1.3 Personal crime experience and feeling of safety

Perceived safe and unsafe areas by participants with or without previous violent crime experience

Personal experience with violent crime can influence how individuals perceive safety and helps to explain spatial patterns of fear and vulnerability. Participants were asked the question: "**Have you ever experienced a violent crime?**"

As shown in the graph, the majority of respondents (269 participants) indicated they had not experienced a violent crime, while 222 participants reported having been victims of such incidents.
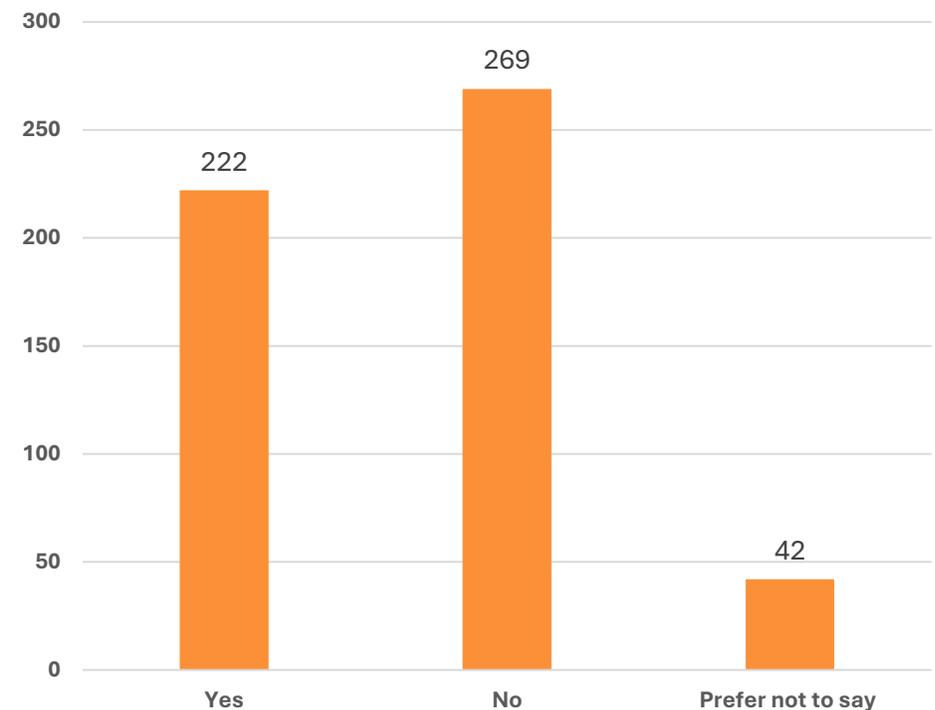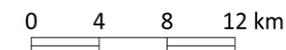
Perceived safe and unsafe areas by participants with previous violent crime experience

Perceived safe areas
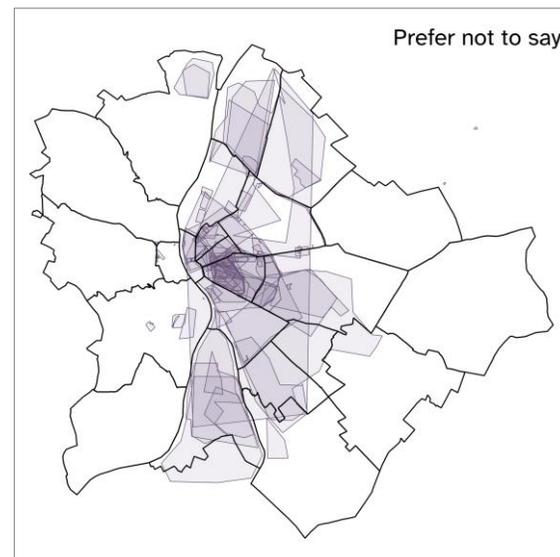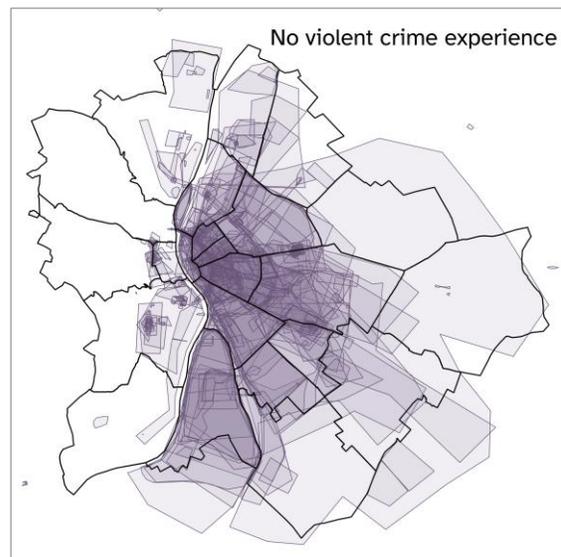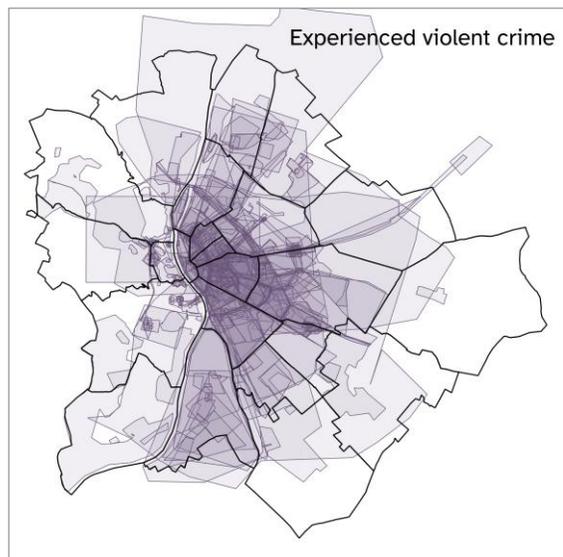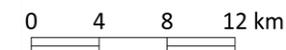
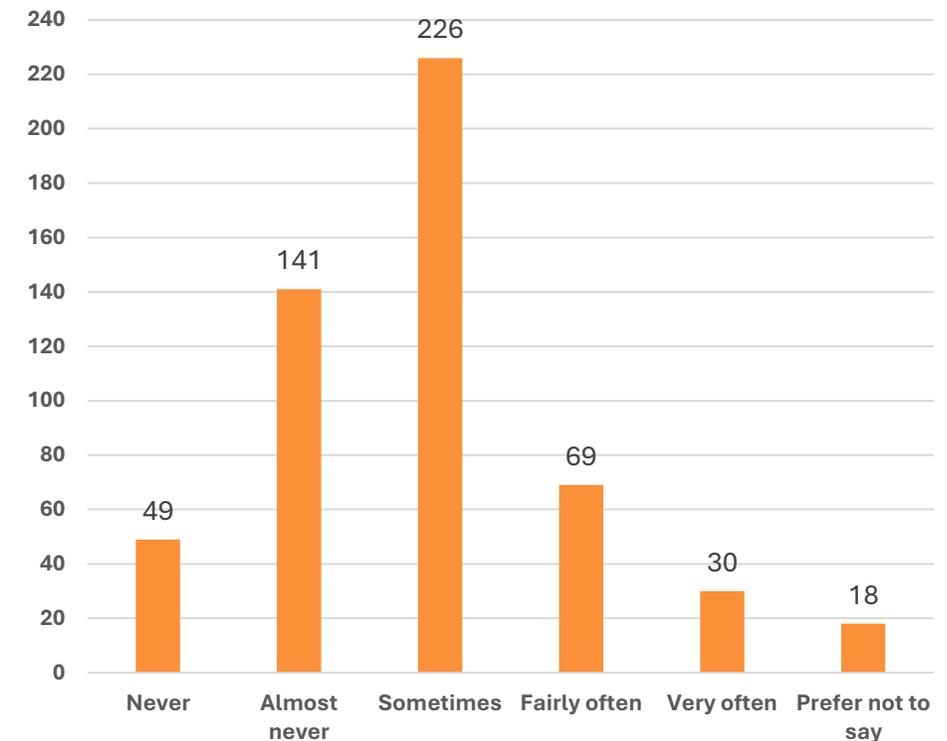District boundary

Perceived unsafe areas

District boundary

0   4   8   12 km

1. CRIME PERCEPTION IN **BUDAPEST, HUNGARY**

1.3 Personal crime experience and feeling of safety

Perceived safe and unsafe areas by participants with or without previous property crime experience

Personal experience with property crime can also influence how individuals perceive safety in their surroundings. To better understand this relationship, participants were asked: "**Have you ever experienced a property crime?**"

As shown in the graph, the majority of respondents (390 participants) reported that they had not been victims of property crime, while 99 participants indicated that they had experienced such incidents.

Perceived safe and unsafe areas by participants with previous property crime experience

Index

Perceived safe areas

District boundary

Perceived unsafe areas

District boundary

0   4   8   12 km

1. CRIME PERCEPTION IN **BUDAPEST, HUNGARY**

1.3 Personal crime experience and feeling of safety

Perceived safe and unsafe areas according to frequency of insecurity feelings

Participants were also asked how often they had **experienced feelings of insecurity or vulnerability in the past month**. The results show that the most common response was "sometimes," followed by "almost never" and "fairly often."

The maps presented in this section illustrate how the frequency of these feelings is linked to spatial patterns of perceived safety.

Perceived safe areas according to frequency of insecurity feelings

Index

Perceived safe areas

District boundary

0   4   8   12 km

Perceived unsafe areas according to frequency of insecurity feelings

Index

Never

Almost never

Sometimes

Fairly often

Very often

Prefer not to say

Perceived unsafe areas

District boundary

0   4   8   12 km
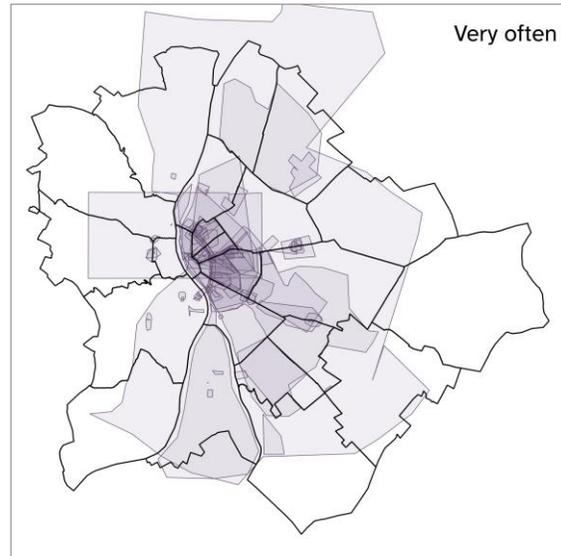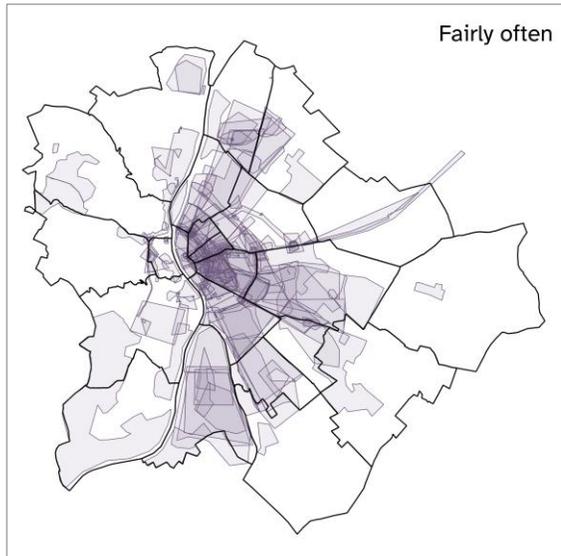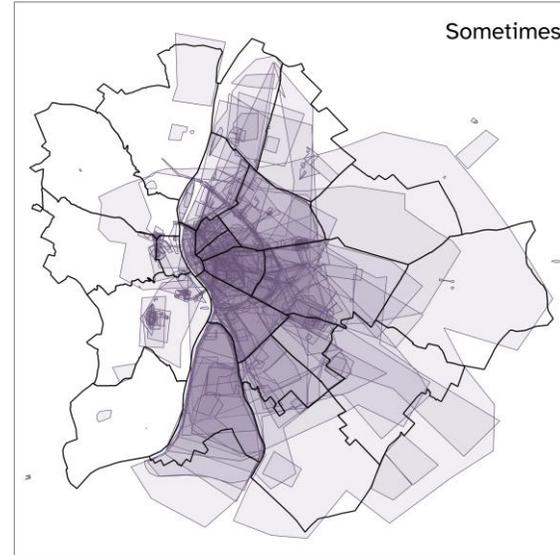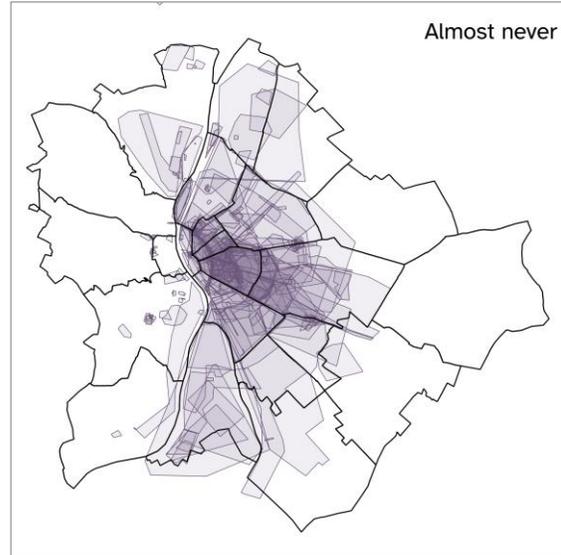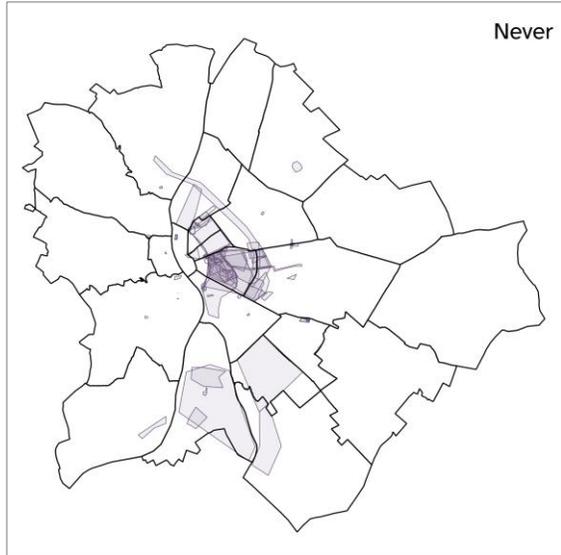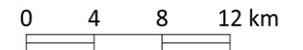
1.4 Crime perception by demographics

In this section, we present the safety perceptions of participants in Budapest, analyzed according to three demographic characteristics: **gender**, **age range**, and **length of residency** in the city. By examining these demographic groups separately, we aim to identify whether certain populations feel more vulnerable or more secure, and how these perceptions align with the broader patterns observed in the data.

Content:

- Perceived safe and unsafe areas by gender GO

- Perceived safe and unsafe areas by age range GO

- Perceived safe and unsafe areas by length of residency GO

1. CRIME PERCEPTION IN **BUDAPEST, HUNGARY**
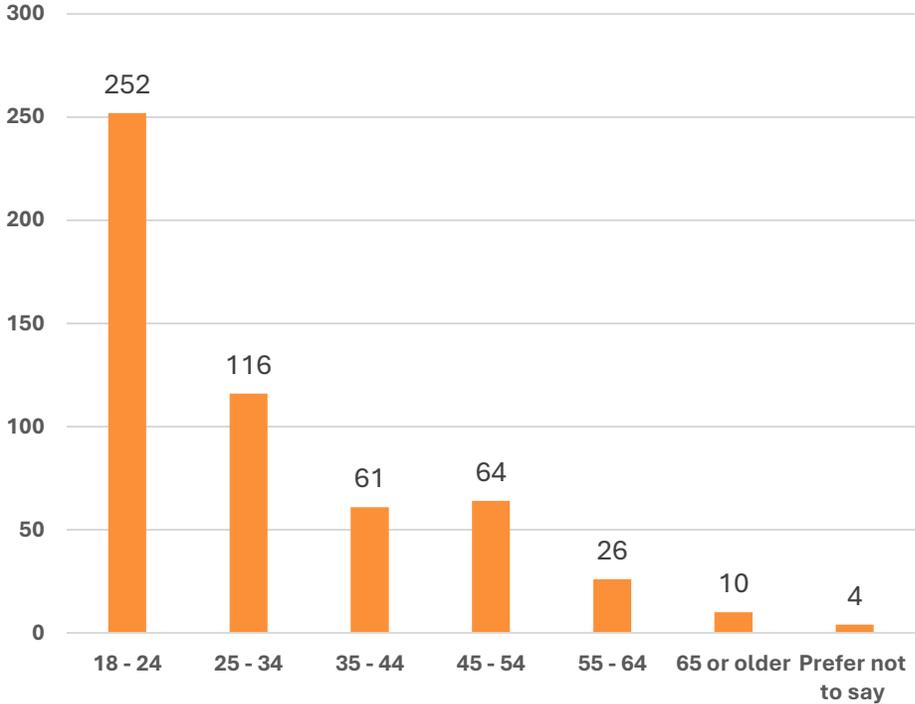
1.4 Crime perception by demographics

Perceived safe and unsafe areas by gender

A total of 533 participants took part in the survey. Among them, 225 identified as women, 298 as men, and 2 participants selected the "Other" category, which includes those who responded with options not listed in the predefined choices, such as intersex, diverse, or open. Additionally, 8 participants preferred not to disclose their gender.

This distribution provides an overview of the gender composition of the respondents and allows us to explore how safety perceptions may vary between different gender groups.
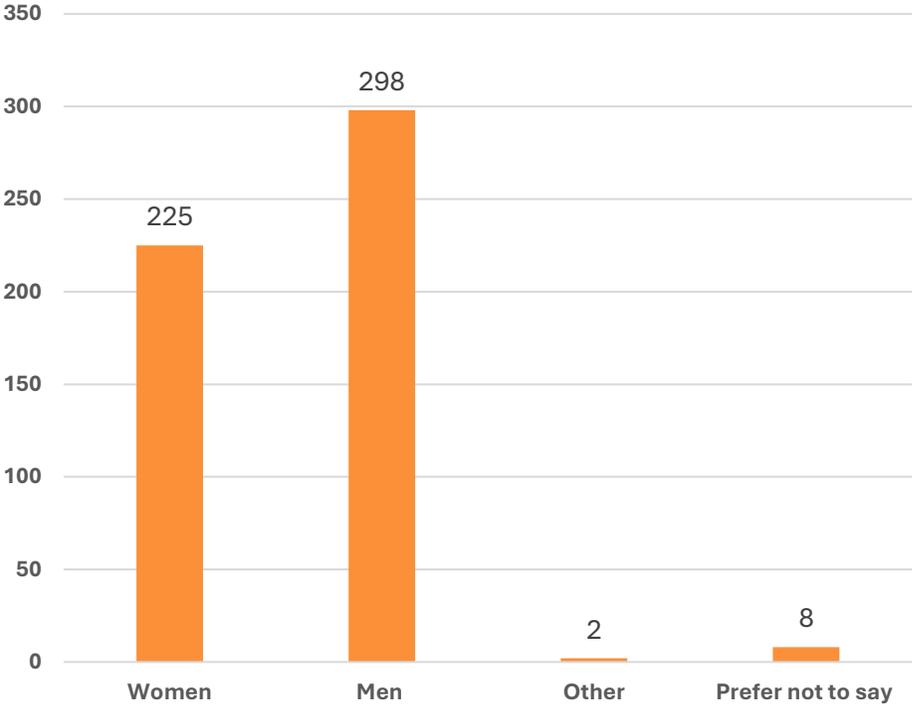
Perceived safe areas by gender
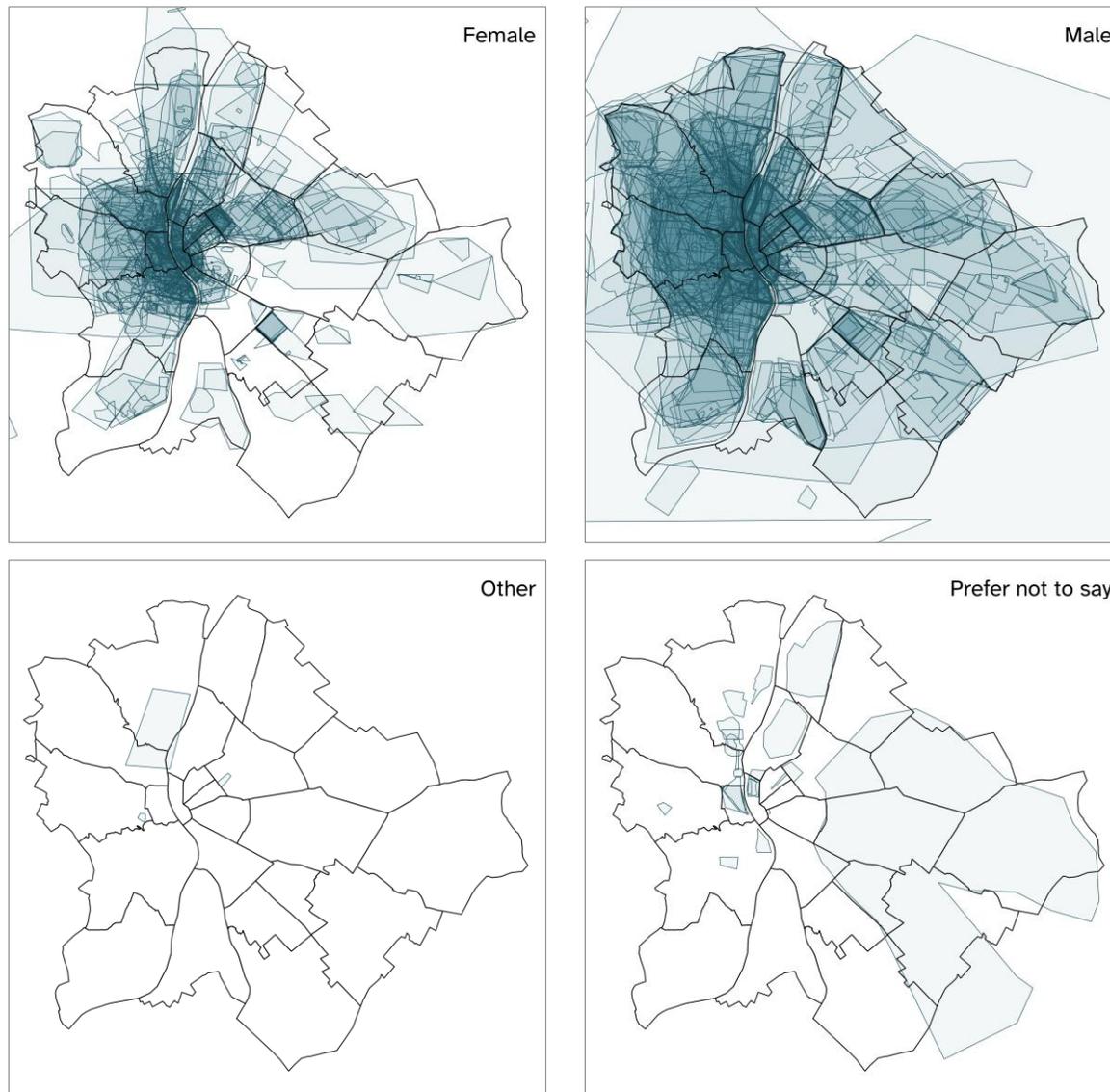
Female

Male

Other

Prefer not to say

Perceived safe areas

District boundary

0   4   8   12 km

Perceived unsafe areas by gender

Female

Male

Other

Prefer not to say

Perceived unsafe areas

District boundary

0   4   8   12 km
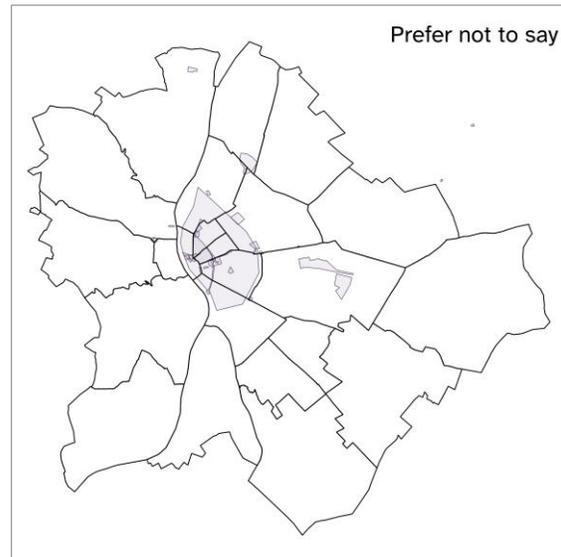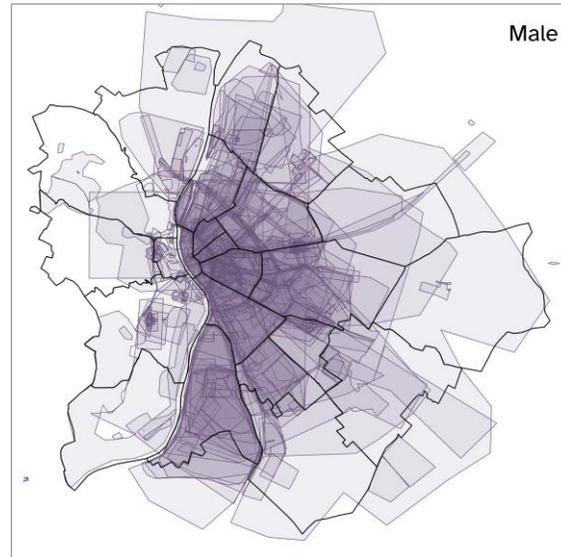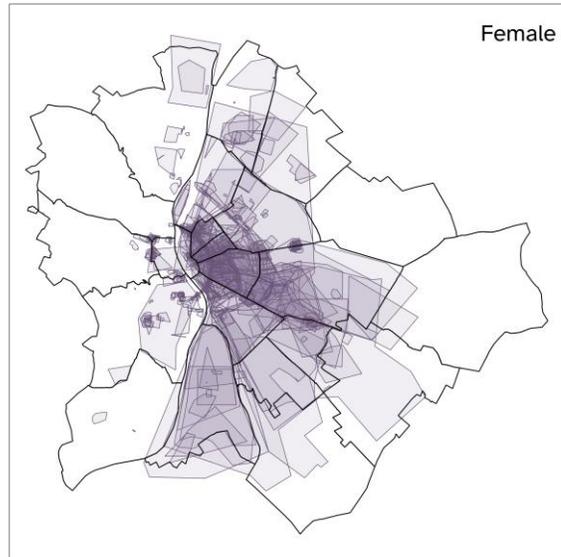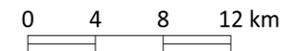
1. CRIME PERCEPTION IN **BUDAPEST, HUNGARY**

1.4 Crime perception by demographics
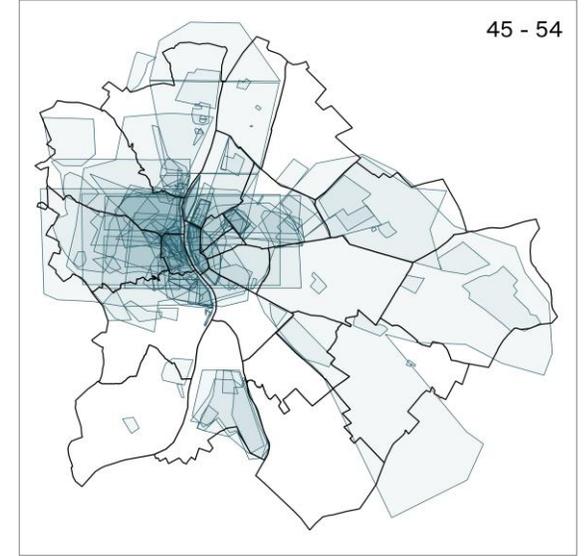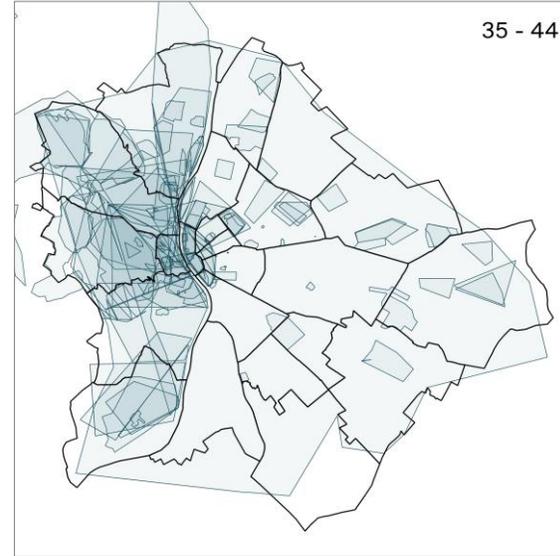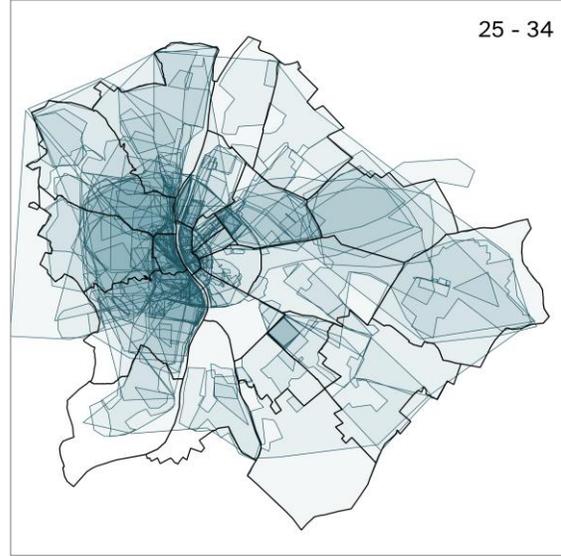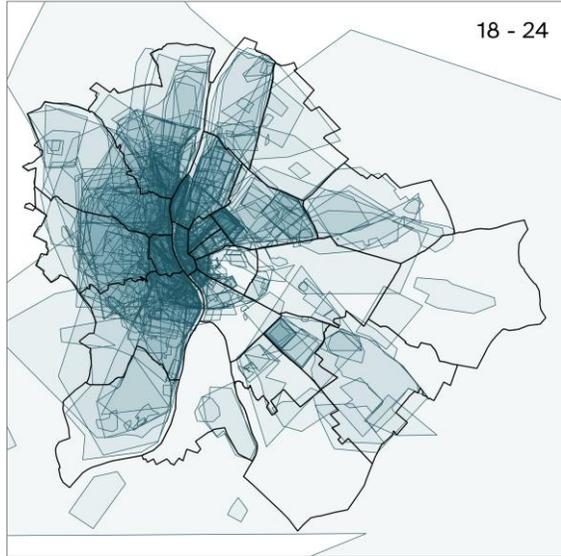
Perceived safe and unsafe areas by age range

The age distribution of participants shows a diverse group, with a noticeable concentration of younger respondents, the majority were under 35 years old.
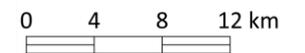
While **most participants were in the 18 to 24 and 25 to 34** age ranges, the survey also captured perspectives from older age groups, ensuring a broad understanding of how safety perceptions vary across different stages of life.
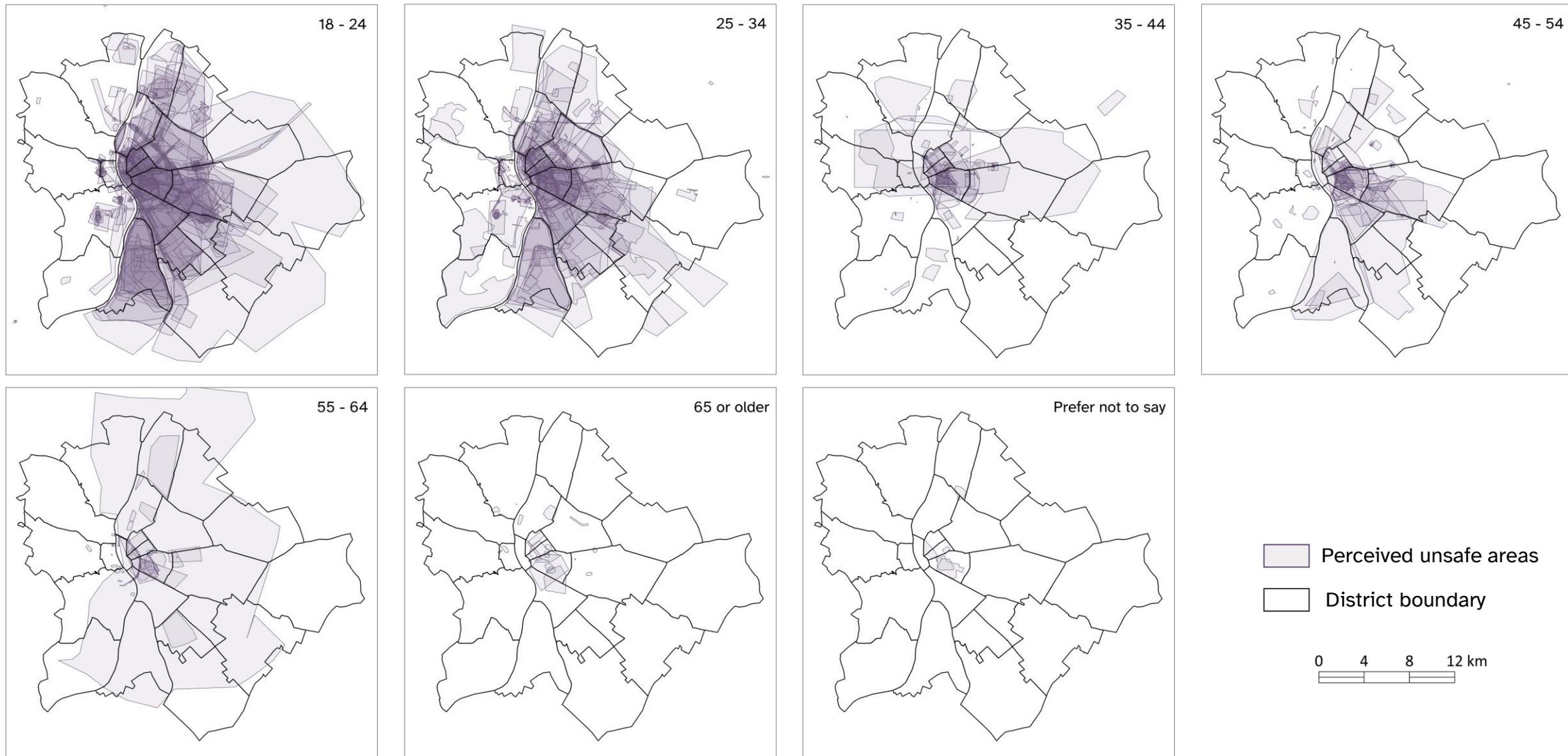
Perceived safe areas by age range
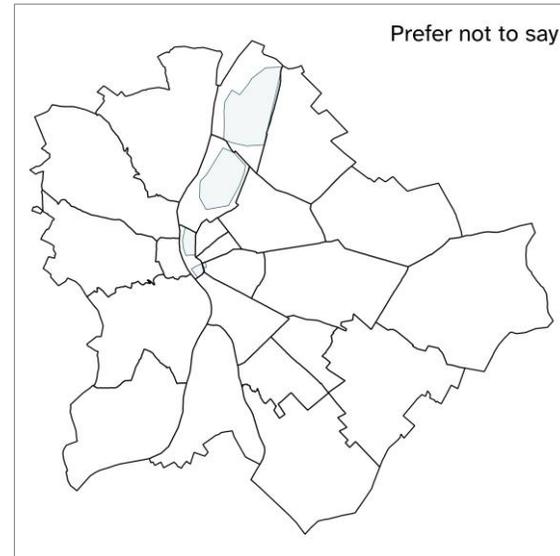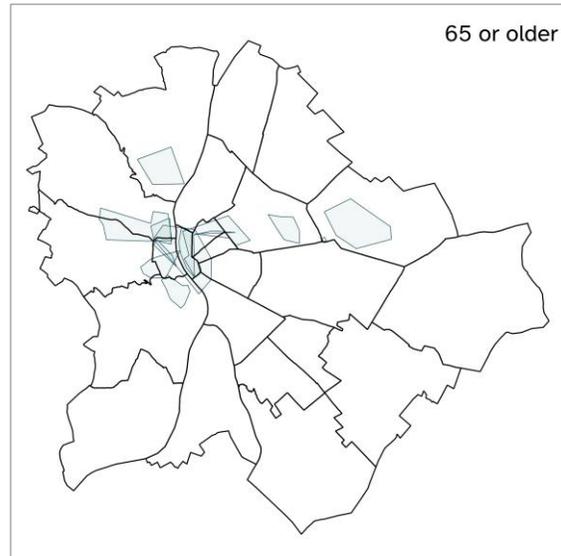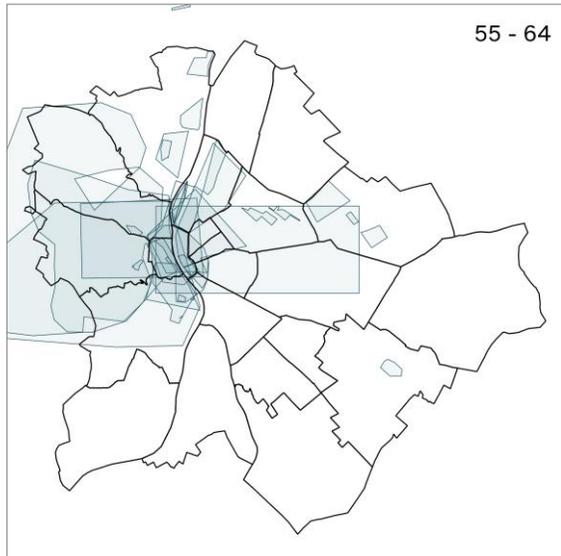
Perceived unsafe areas by age range

18 - 24

25 - 34

35 - 44

45 - 54

55 - 64

65 or older

Prefer not to say

Perceived unsafe areas

District boundary

0   4   8   12 km

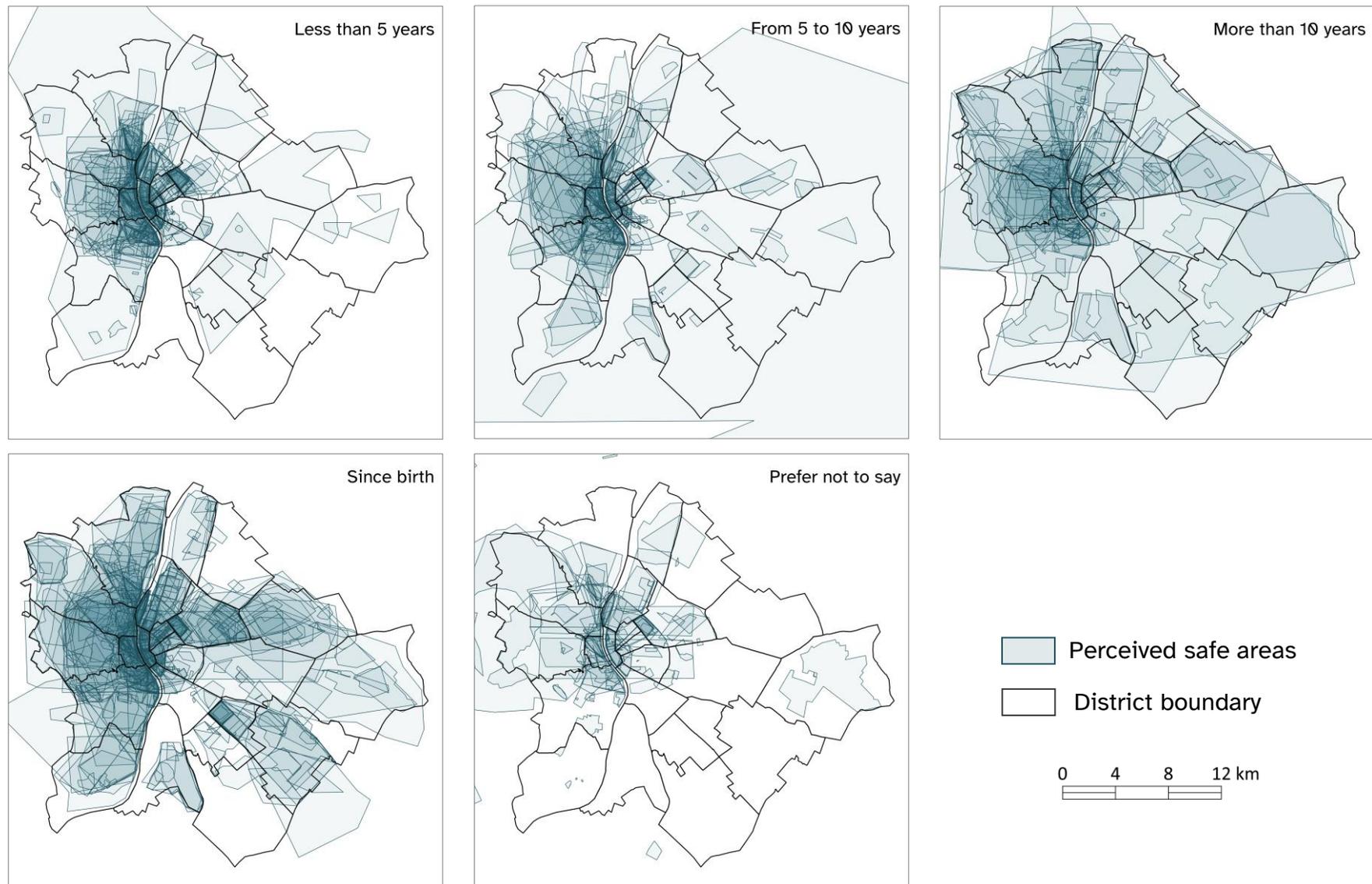# 1. CRIME PERCEPTION IN **BUDAPEST, HUNGARY**

1.4 Crime perception by demographics

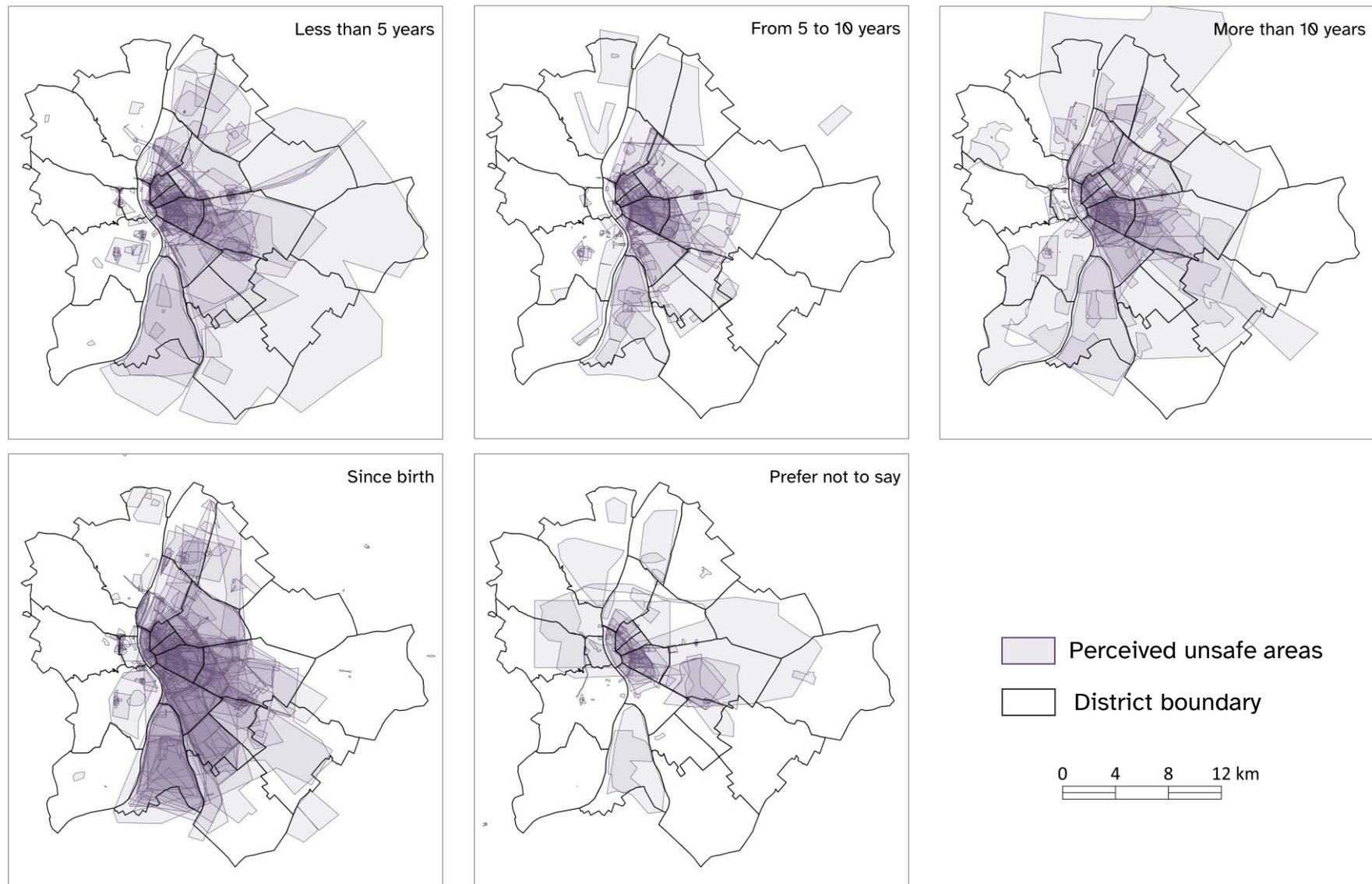### Perceived safe and unsafe areas by length of residency

The survey included participants with a wide range of residency lengths in Budapest. A **significant percentage of respondents have lived in the city since birth**, while others have resided there for varying periods, from less than five years to over a decade. This diversity in residency duration allows for the analysis of how familiarity and time spent in the city may influence perceptions of safety and crime.
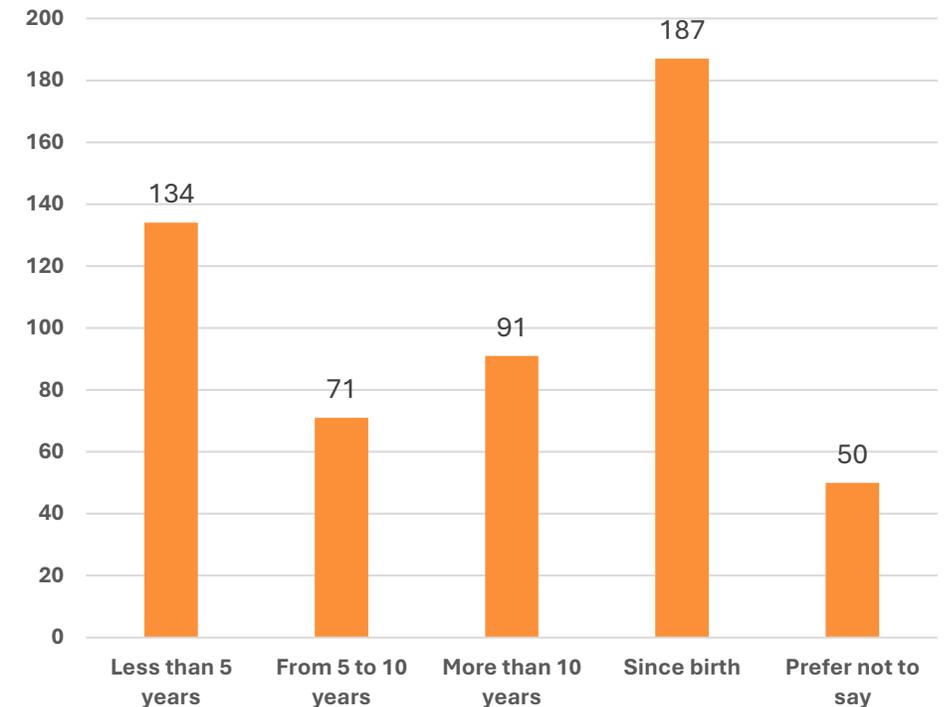
Perceived safe areas by length of residency

Perceived unsafe areas by length of residency

Less than 5 years

From 5 to 10 years

More than 10 years

Since birth

Prefer not to say

Perceived unsafe areas

District boundary

0   4   8   12 km

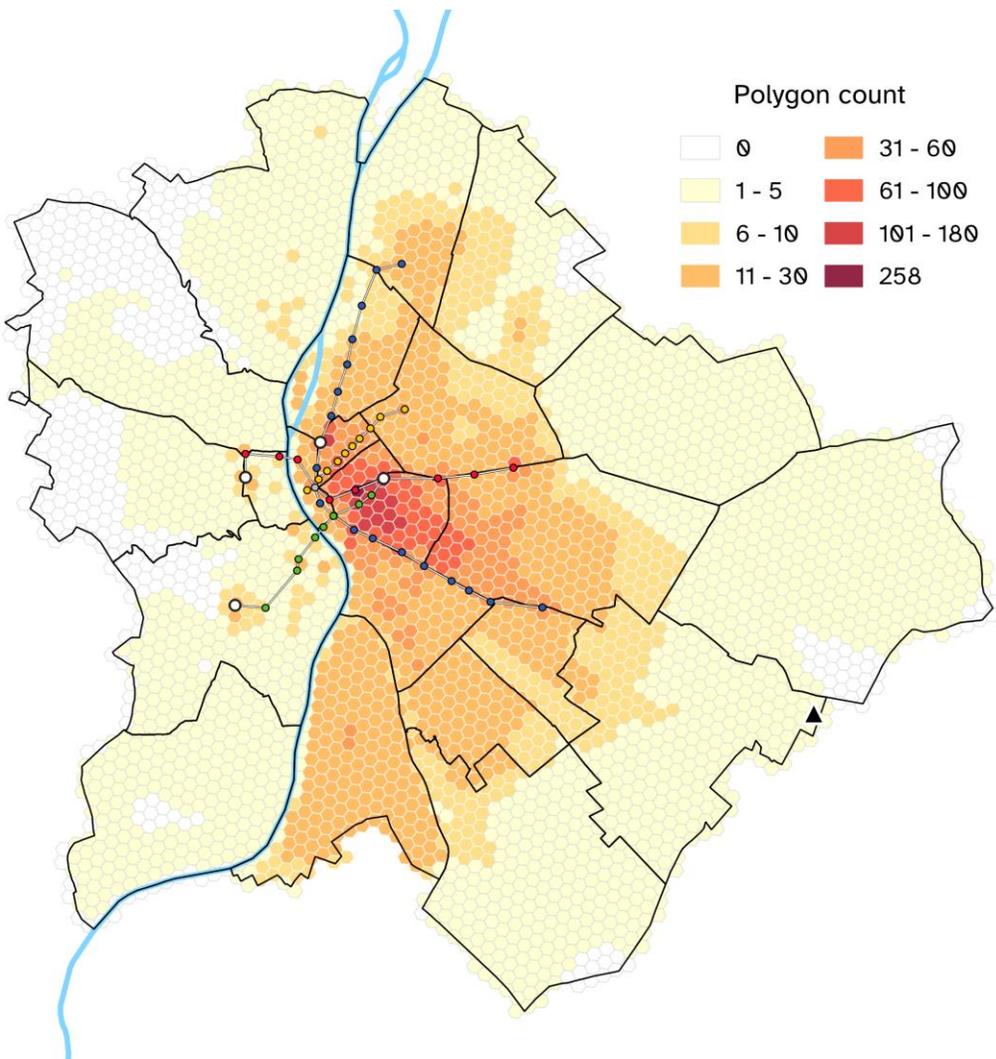# 1.5 Collective perception of safety (grid-based analysis)

To analyze the sketched polygons, a hexagonal grids was generated to spatially segment the city. Each hexagonal cell covers an area of approximately 0.15 km^2, comparable to the size of a neighborhood. The centroids of the hexagonal cells were calculated and used as reference points for the analysis. The count of polygons intersecting each centroid was used to determine how many times each cell was identified as safe or unsafe.
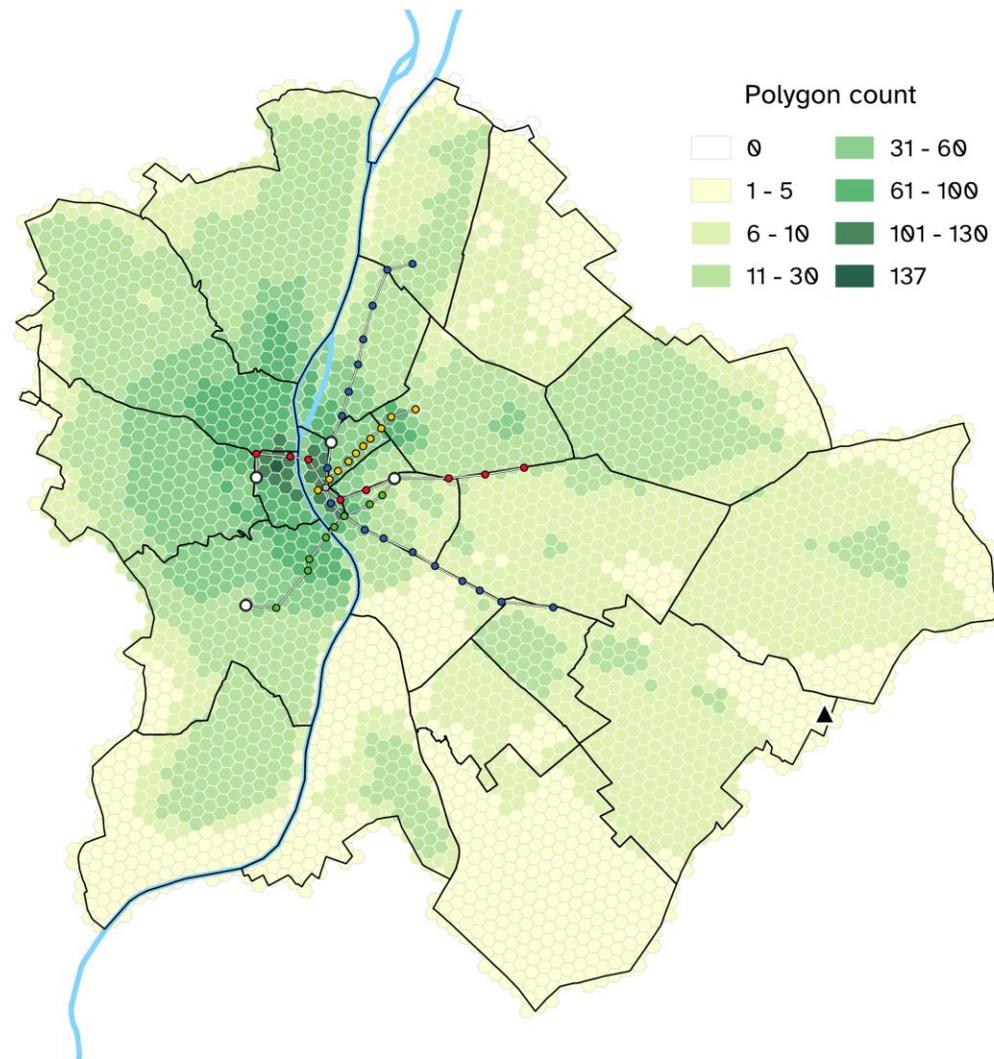
Content:

- Perceived safe and unsafe areas (grid view) GO

- Detected patterns of perceived safety and insecurity (Binomial test) GO

- Spatial Crime Perception Gap (SCPG) GO

Perceived safe and unsafe areas (grid view)
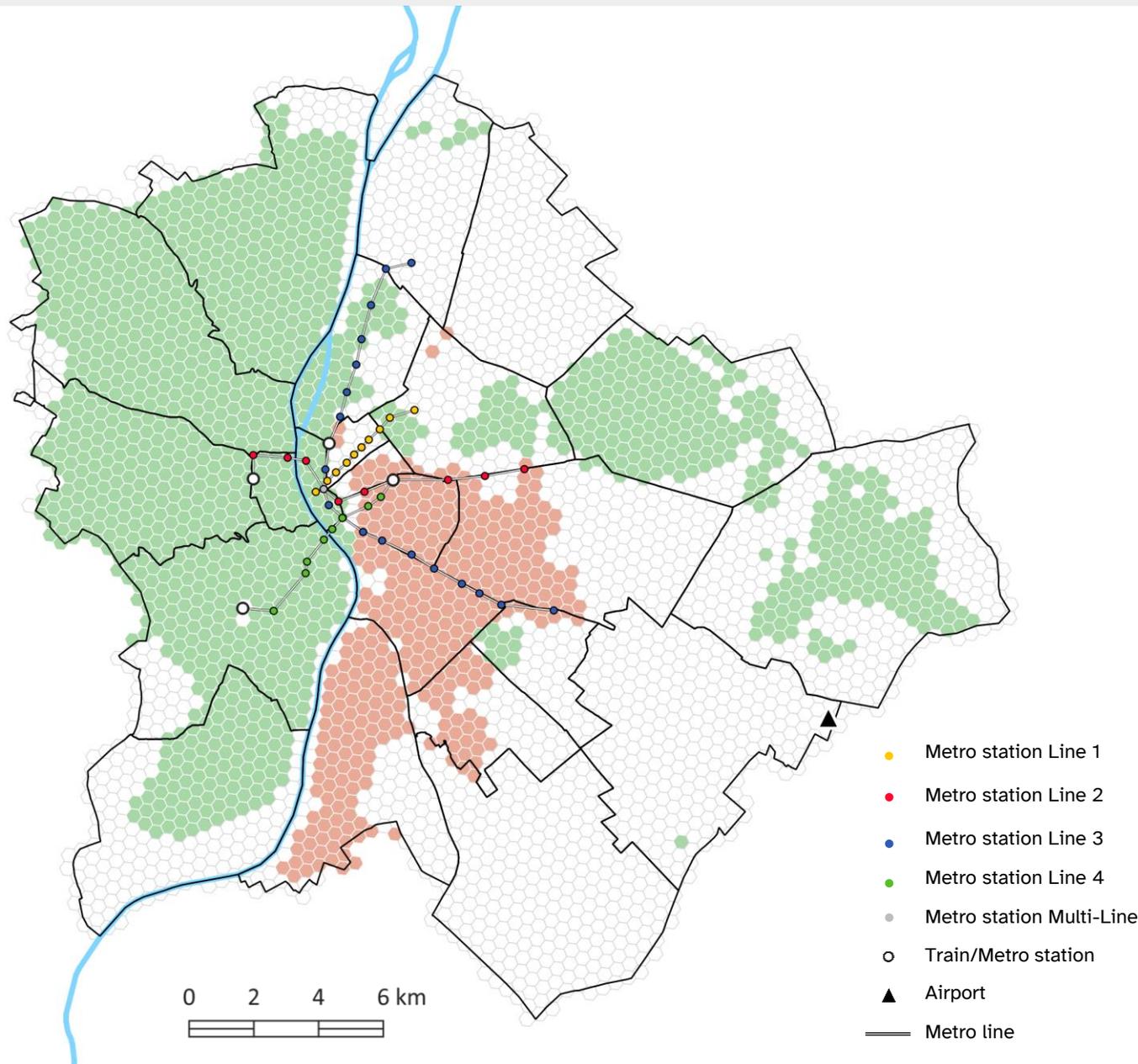
Index

Perceived **safe** areas

Polygon count

0	31 - 60
1 - 5	61 - 100
6 - 10	101 - 180
11 - 30	258

Perceived **unsafe** areas

Polygon count

0	31 - 60
1 - 5	61 - 100
6 - 10	101 - 130
11 - 30	137

Metro station Line 1
Metro station Line 2
Metro station Line 3
Metro station Line 4
Metro station Multi-Line
Train/Metro station
Airport
Metro line

0 2 4 6 km

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Detected patterns of perceived safety and insecurity (Binomial test)

Metro station Line 1
Metro station Line 2
Metro station Line 3
Metro station Line 4
Metro station Multi-Line
Train/Metro station
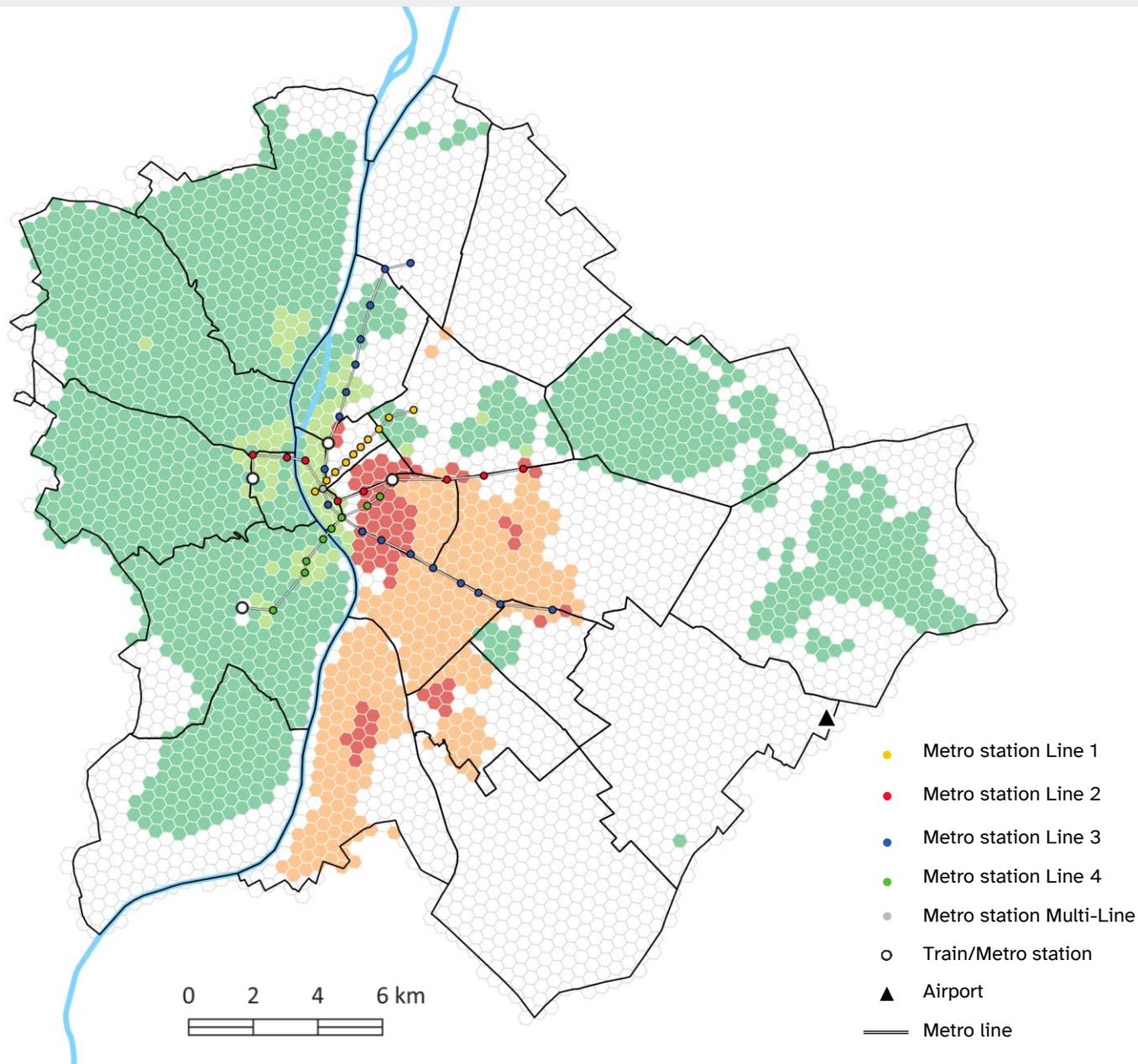Airport
Metro line

0   2   4   6 km

To determine which areas were clearly perceived as safe or unsafe, a statistical method called the **binomial test** was used. This test determine whether the number of people who marked a specific area as *safe* or *unsafe* was high enough to be considered **statistically meaningful**.

For each hexagon, the test looked at how many times it was marked as safe or unsafe. If the results showed a clear preference, and the difference was strong enough to pass a statistical threshold, that area was considered significant.

The hexagons were then grouped into three categories:

Perceived Safe: significantly more safe markings than unsafe.

Perceived Unsafe: significantly more unsafe markings than safe.

Not Significant: no strong difference, perceptions were mixed or unclear.

Spatial Crime Perception Gap (SCPG)

Index

Metro station Line 1
Metro station Line 2
Metro station Line 3
Metro station Line 4
Metro station Multi-Line
Train/Metro station
Airport
Metro line

To explore the spatial crime perception gap, we contrasted areas perceived as either safe or unsafe (binomial test) with a reference map derived from statistical analysis of crime data (spatial autocorrelation analysis), which highlights areas with high or low crime intensity.

By overlaying both layers, the perception map and the crime data, we were able to identify where perceptions align with reality and where they diverge. Each hexagonal cell was then classified into one of the following types:

REFERENCE

		SAFE	UNSAFE
P E R C E P T I O N	SAFE	Accurate perception as safe areas (AS)	Inaccurate perception as safe areas (IS)
	UNSAFE	Inaccurate perception as unsafe areas (IU)	Accurate perception as unsafe areas (AU)

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1.6 Urban conditions associated with safety perceptions

After identifying areas they perceived as safe or unsafe on the map of Budapest, participants were asked to select urban characteristics that best described those areas. These included street lighting, security or surveillance measures, maintenance of surroundings and infrastructure, noise levels, overall perception of safety, and social concerns such as the presence of gangs or drug activity. Participants could choose multiple characteristics per area. The following maps present the spatial distribution of these features based on their responses.

Content:

- Collective perception of safety and public lighting conditions   GO
- Collective perception of safety and surveillance presence   GO
- Collective perception of safety and surroundings maintenance   GO
- Collective perception of safety and infrastructure conditions   GO
- Collective perception of safety and levels of noise pollution   GO
- Collective perceptions of safety and general safety perception   GO
- Collective perceptions of safety and social concerns   GO

Collective perception of safety and public lighting conditions
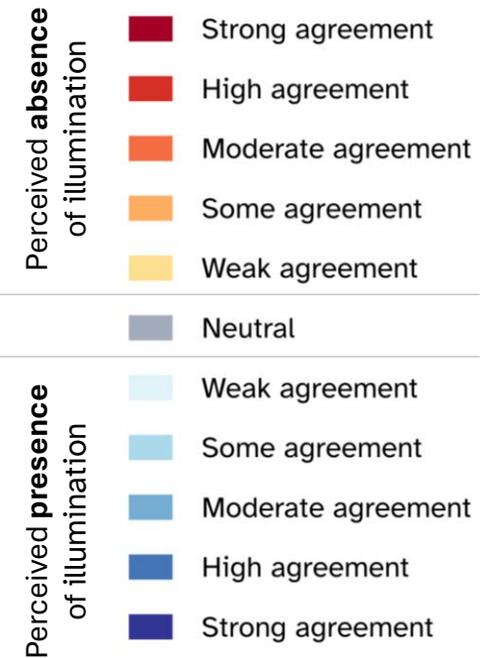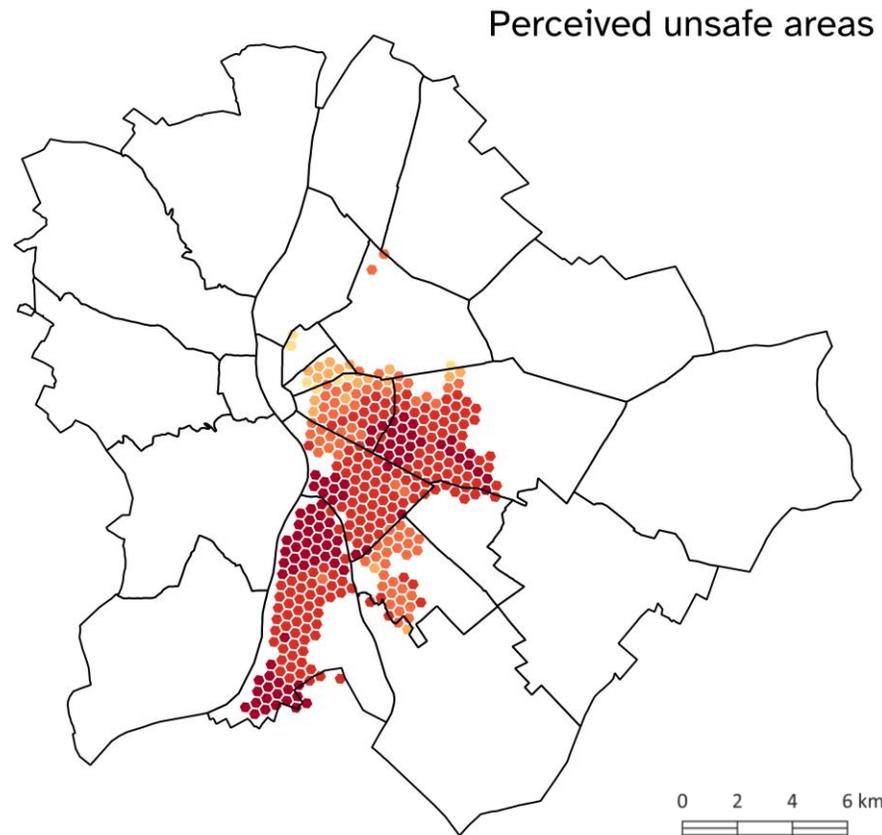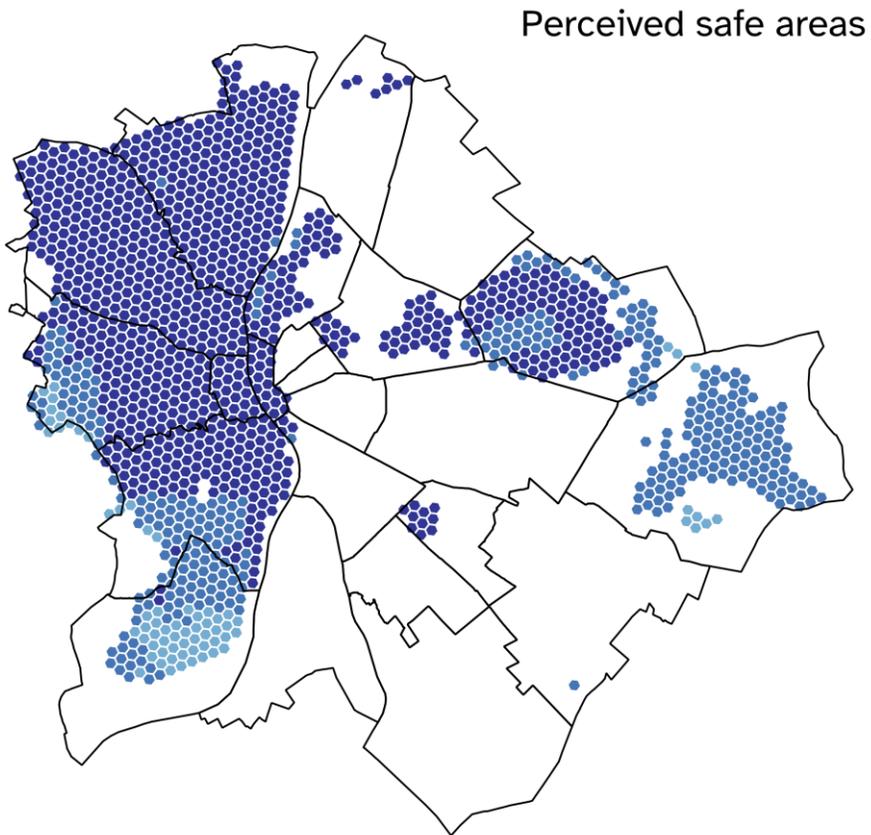
Participants could choose to indicate whether the area had well-lit or poorly lit streets.

Collective perception of safety and surveillance presence

Index
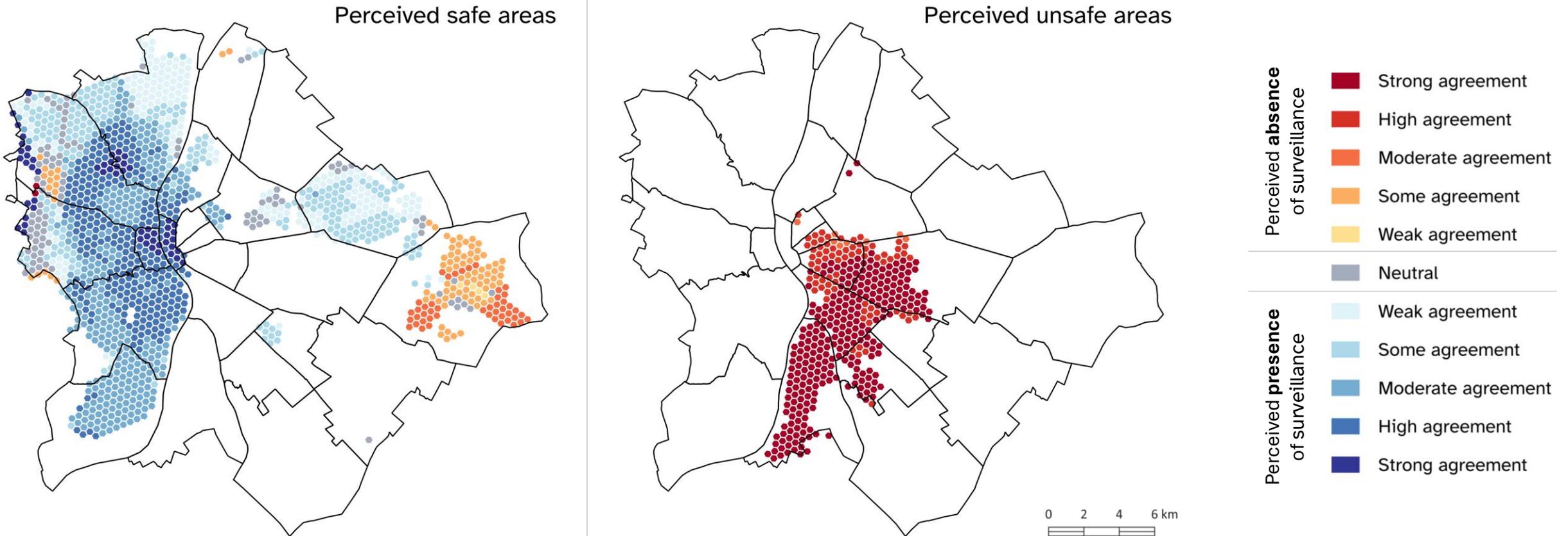
Participants had the option to report the presence or absence of security personnel and/or surveillance measures such as police, CCTV, or street patrols.

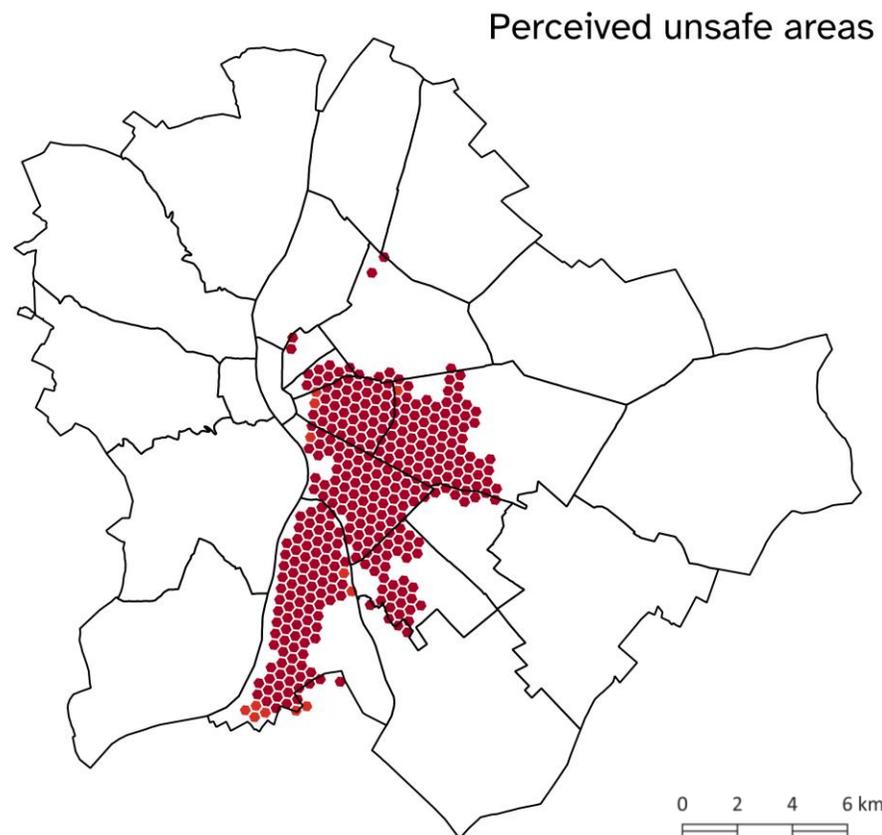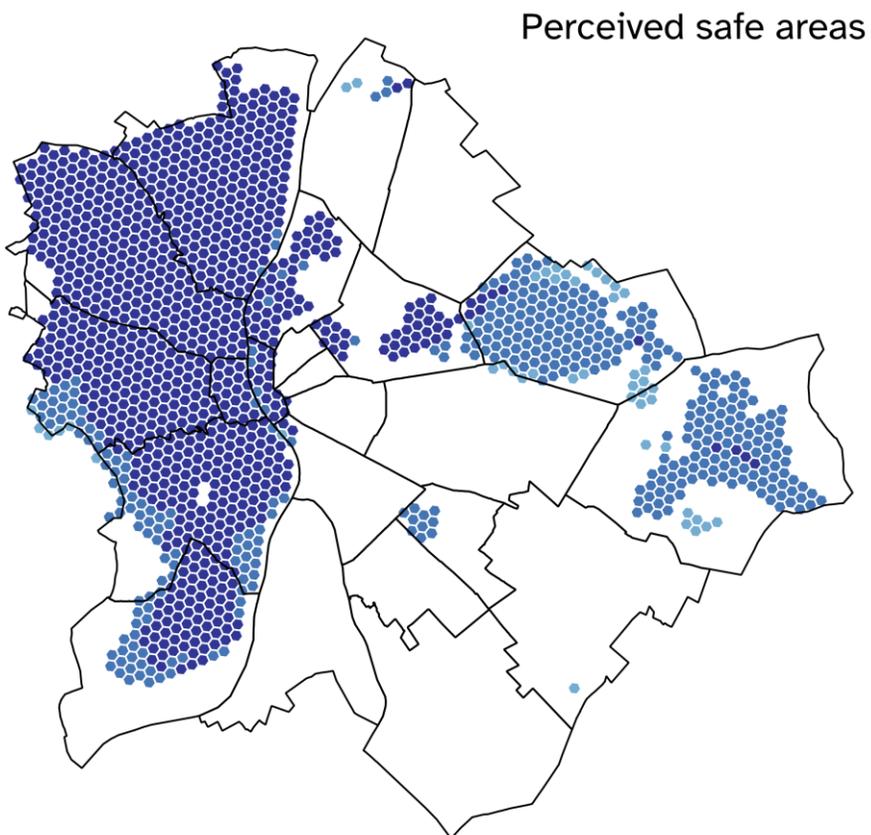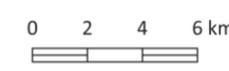## Collective perception of safety and surroundings maintenance
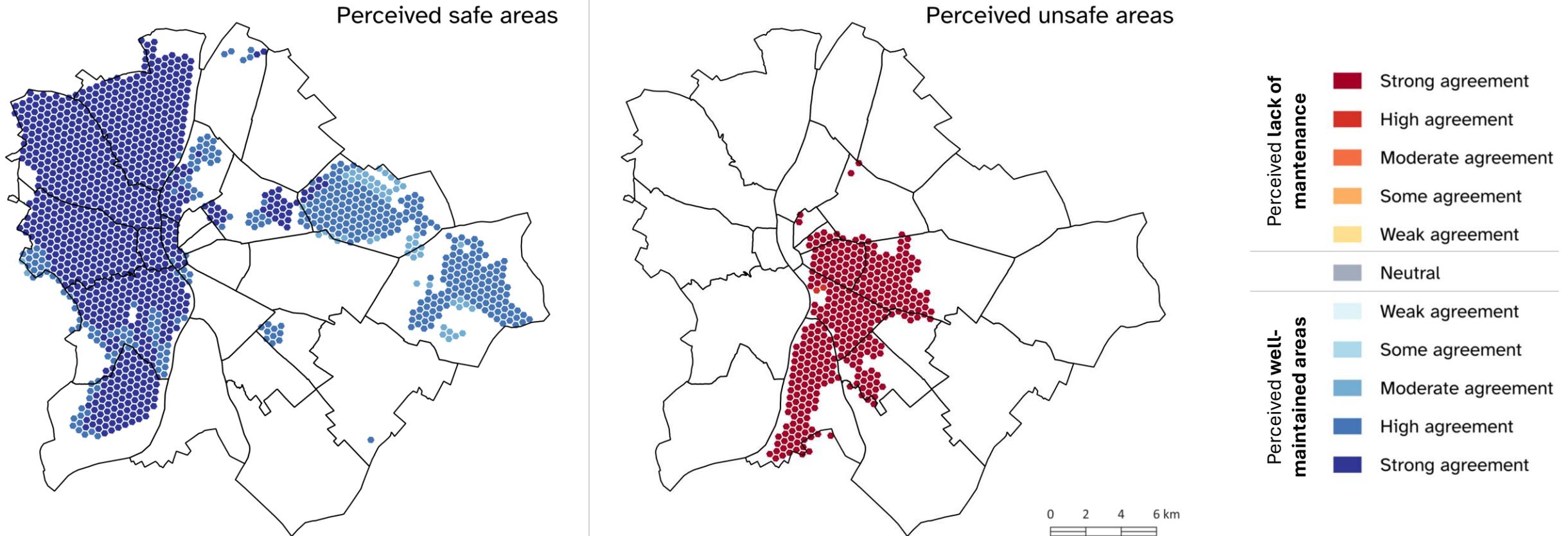
Index

Participants could decide whether to describe the area as well maintained (clean and litter-free) or as poorly maintained, with graffiti, trash, or overgrown vegetation.

Collective perception of safety and infrastructure conditions
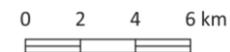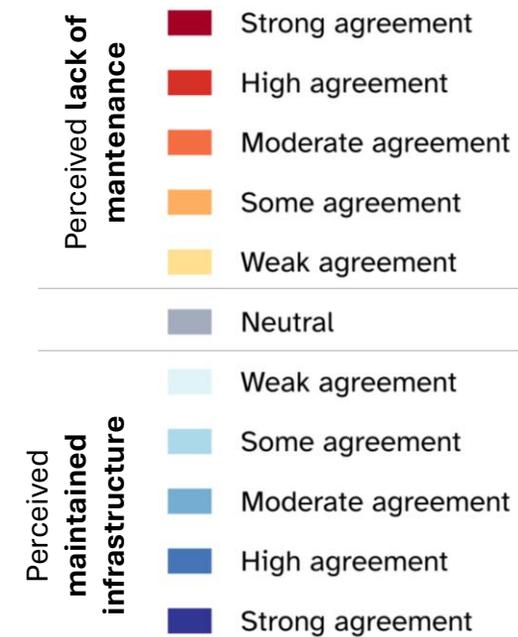
Participants had the choice to describe the condition of infrastructure, such as roads, buildings, and parks, as either well maintained or deteriorated.

Collective perception of safety and levels of noise pollution

Index
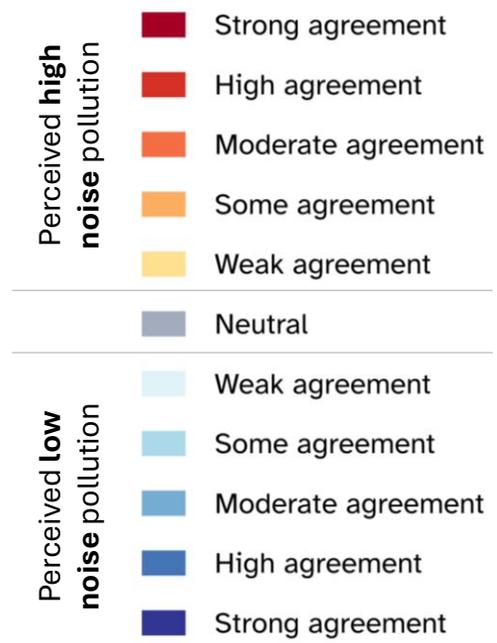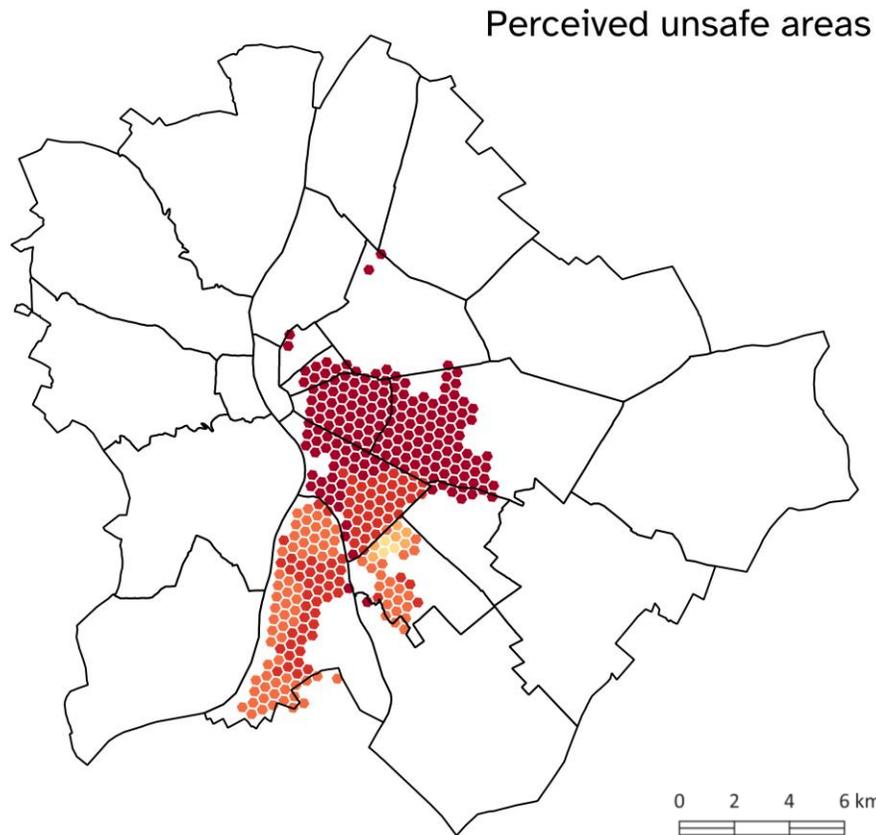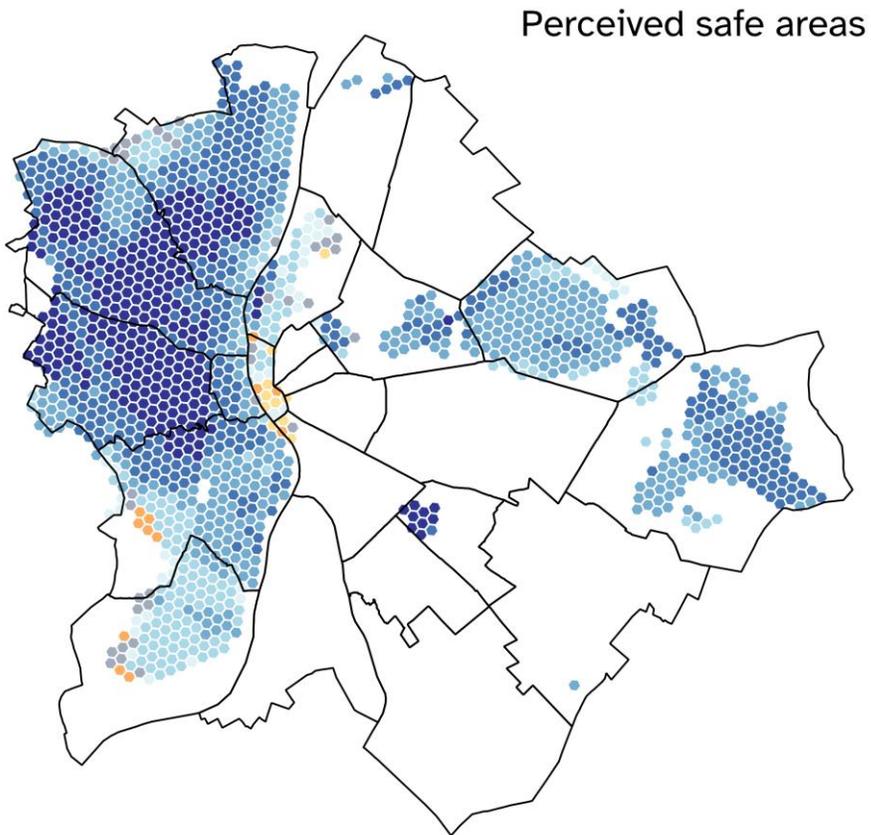
Participants could choose to indicate whether the area typically experiences low or high levels of noise pollution.
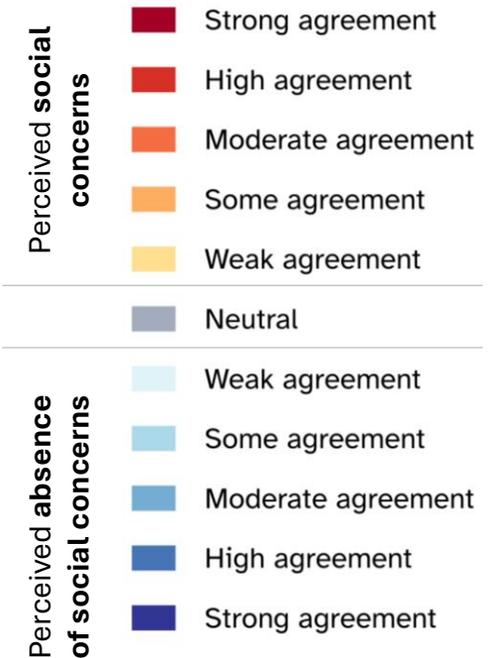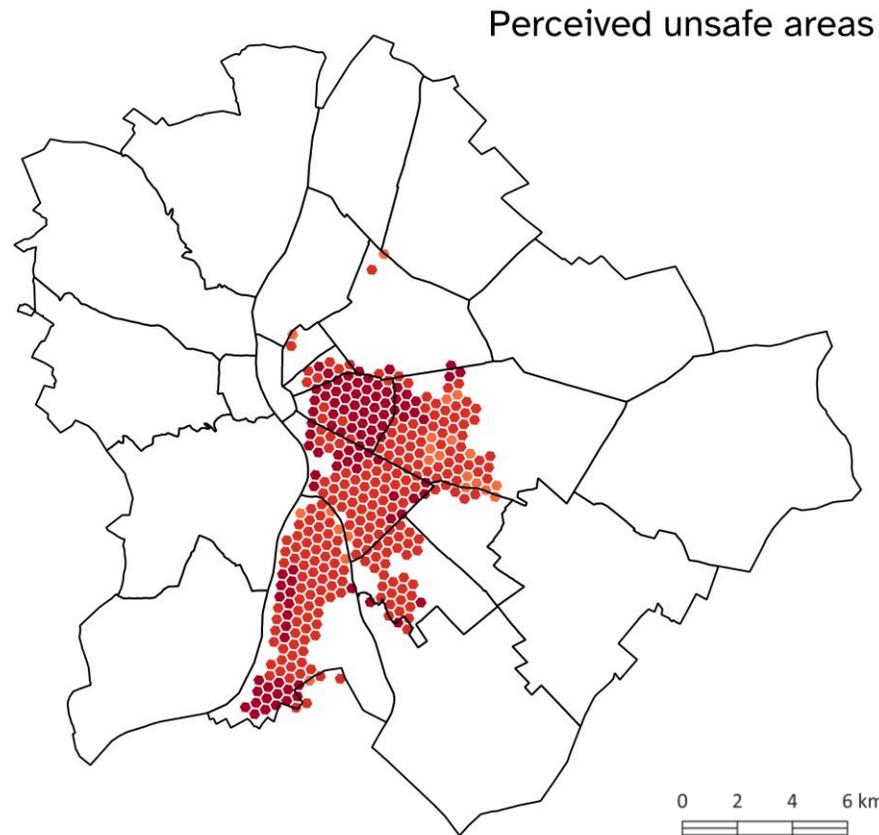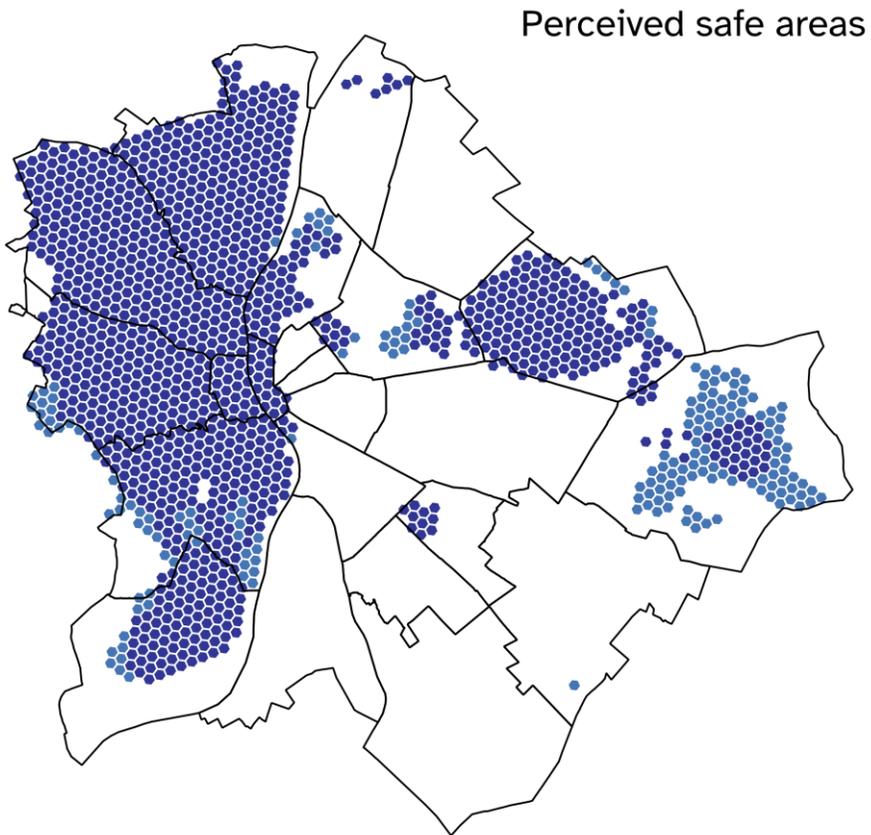
Collective perceptions of safety and general safety perception
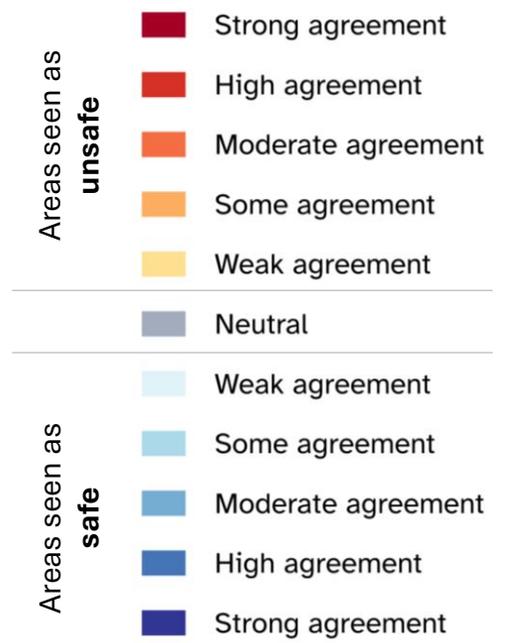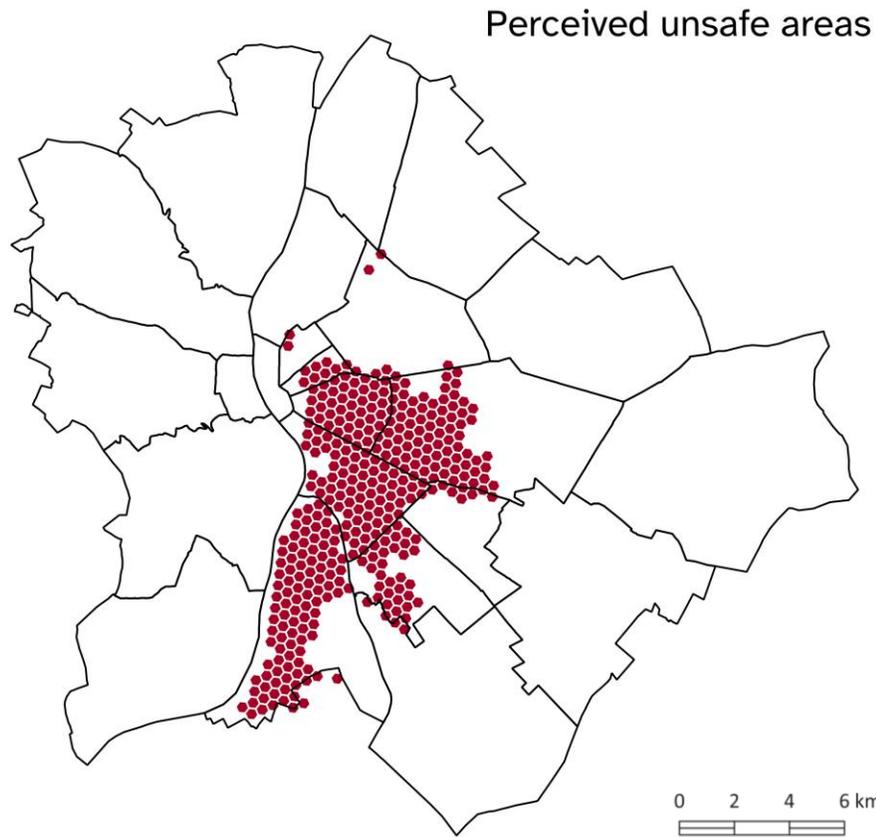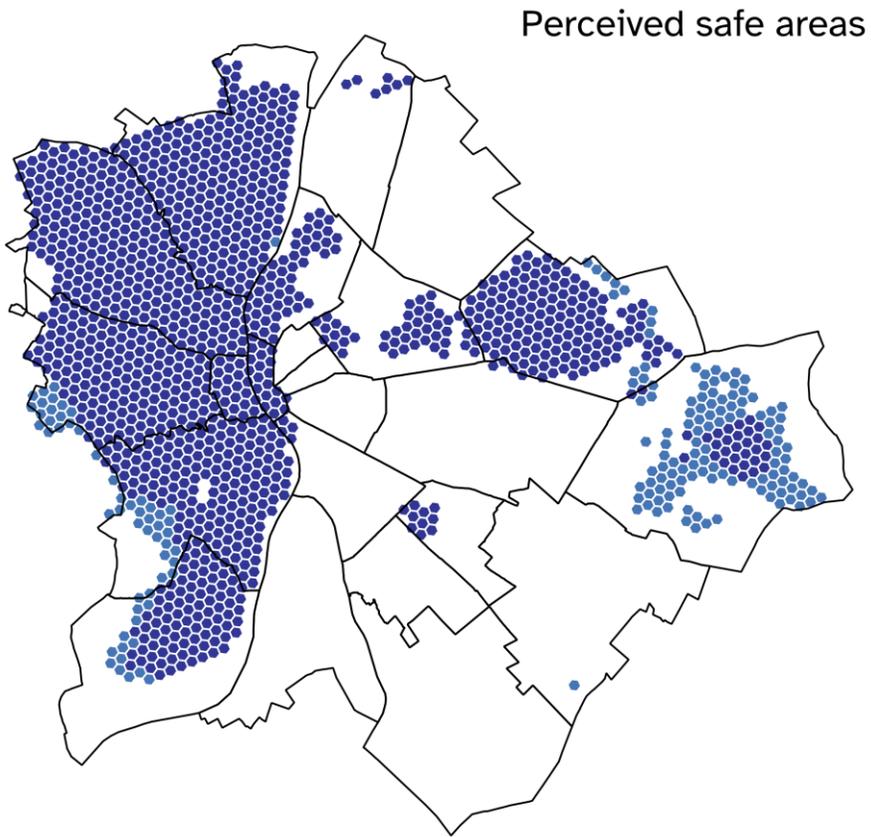
Participants had the option to indicate whether the area is generally perceived by others as secure or unsafe.

Collective perceptions of safety and social concerns
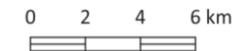
Participants could also choose to report social concerns in the area, such as the presence of gangs, drug activity, or people experiencing homelessness.

Part II

Crime perception in Vienna, Austria

2.1 Area of study

Vienna, the capital of Austria, is divided into 23 districts. The city is located along the Danube River and combines historical architecture with modern infrastructure.

As of 2024, Vienna has a population of approximately 2,005,760 inhabitants, with a population density of 4,835 people per km^2. Compared to Budapest, Vienna reports a higher GDP per capita (€56,600 in 2022), a higher unemployment rate (10% in 2023), and a significantly larger share of residents with foreign citizenship (35.4% in 2024).

Vienna is a major transportation hub, with five main railway stations, supporting both national and international connections. The city's public transport system is highly developed, consisting of a dense network of buses, trams, suburban trains (S-Bahn), and five underground metro lines (U1–U6, excluding U5 under construction) that provide efficient mobility throughout the metropolitan area.

Metro lines and end stations

Metro Line 1
A - Leopoldau
B - Praterstern (train station)
C - Wien Hauptbahnhof (Train Central Station)
D - Oberlaa

Metro Line 2
E - Karlsplatz
F - Seestadt

Metro Line 3
G - Ottakring
H - Westbahnhof (train station)
I - Landstraße
J - Simmering

Metro Line 4
K - Hütteldorf
L - Heiligenstadt

Metro Line 6
M - Floridsdorf
N - Bahnhof Meidling (train station)
O - Siebenhirten

○ Metro station
● Train/Metro station

0   2   4   6 km

2.2 Overall perception of safety

This section provides an overview of how participants perceive safety across different areas of Vienna.

To better understand the broader context of safety perceptions, the following maps illustrate areas identified as safe or unsafe by participants, taking into account their views on the general crime severity in the city and their level of trust in the police.

Content:

- Perceived safe and unsafe areas GO

- Perceived safe and unsafe areas by perceived general crime severity level GO

- Perceived safe and unsafe areas by level of trust in the police GO

2. CRIME PERCEPTION IN **VIENNA, AUSTRIA**

2.2 Overall perception of safety

Perceived safe and unsafe areas

We gathered responses from **123 participants**, who marked a total of **255 safe areas** (identified by 108 participants) and **297 unsafe areas** (identified by 107 participants) throughout the city.

Perceived safe and unsafe areas

Index

Overall perceived **safe** areas

Overall perceived **unsafe** areas

Perceived safe areas

Perceived unsafe areas

District boundary

Metro station Line 1

Metro station Line 2

Metro station Line 3

Metro station Line 4

Metro station Line 6

Metro station Multi-Line

Train/Metro station

Metro line

0   2   4   6 km

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2. CRIME PERCEPTION IN **VIENNA, AUSTRIA**

2.2 Overall perception of safety

Perceived safe and unsafe areas by general crime severity level

To gain a broader understanding of how residents perceive crime, participants were asked to rate the overall severity of criminal activity in the city.

In Vienna, the graph shows that the **majority of respondents perceived crime severity as low or very low**, with fewer participants selecting moderate levels and only a small number considering crime severity to be high or very high.
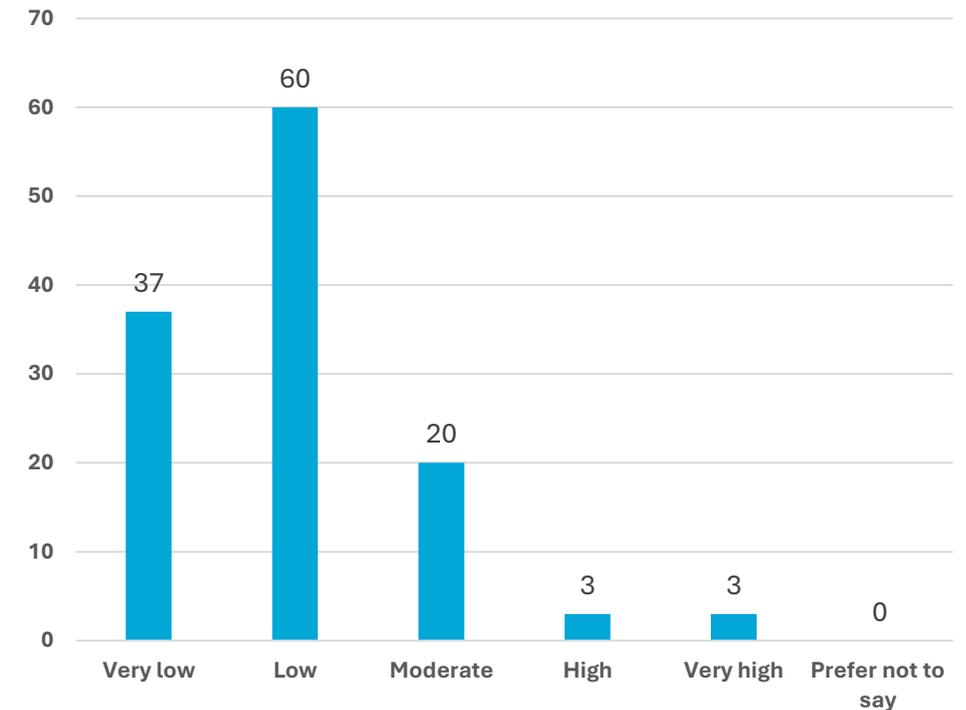
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Perceived safe areas by participants' perception of general crime severity in the city

Very low

Low

Moderate

High

Very high

Perceived safe areas

District boundary

0   4   8   12 km

Perceived unsafe areas by participants' perception of general crime severity in the city

Very low

Low

Moderate

High

Very high

Perceived unsafe areas

District boundary

0   4   8   12 km
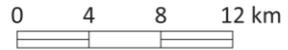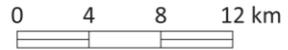
2. CRIME PERCEPTION IN **VIENNA, AUSTRIA**

2.2 Overall perception of safety

Perceived safe and unsafe areas by level of trust in the police

Trust in law enforcement can significantly influence how people perceive safety in their surroundings. Participants in Vienna were asked to rate their level of trust in the police.

As the graph illustrates, most participants reported moderate to high levels of trust, while smaller groups expressed low or very low trust.
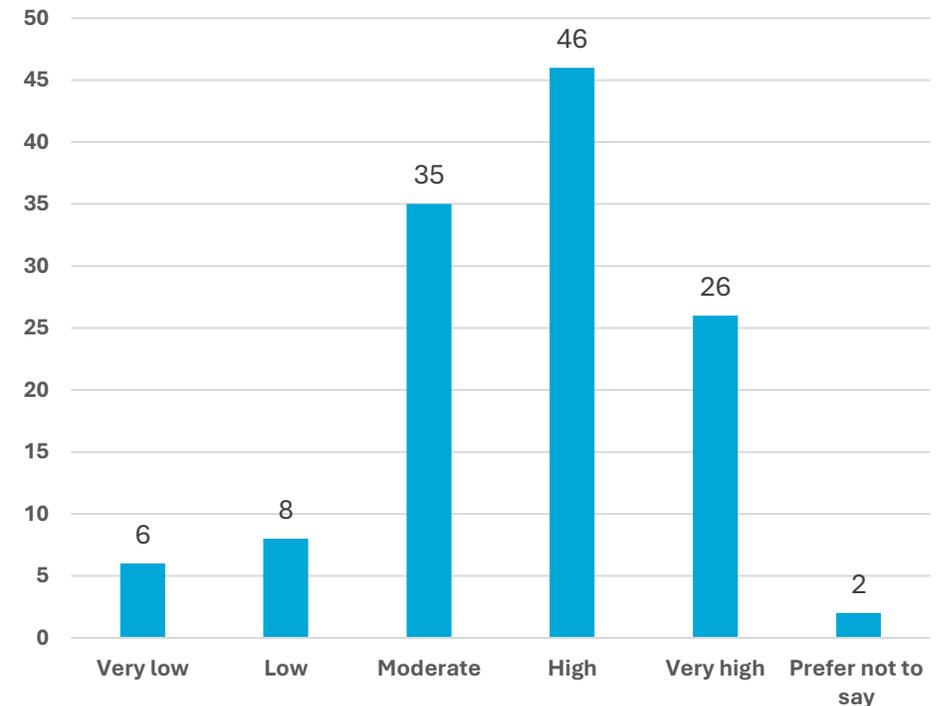
Perceived safe areas sketched by participants based on their level of trust in the police

Index

Perceived safe areas

District boundary

0   4   8   12 km

Perceived unsafe areas sketched by participants based on their level of trust in the police

Very low

Low

Moderate

High

Very high

Perceived unsafe areas

District boundary

0   4   8   12 km
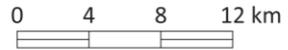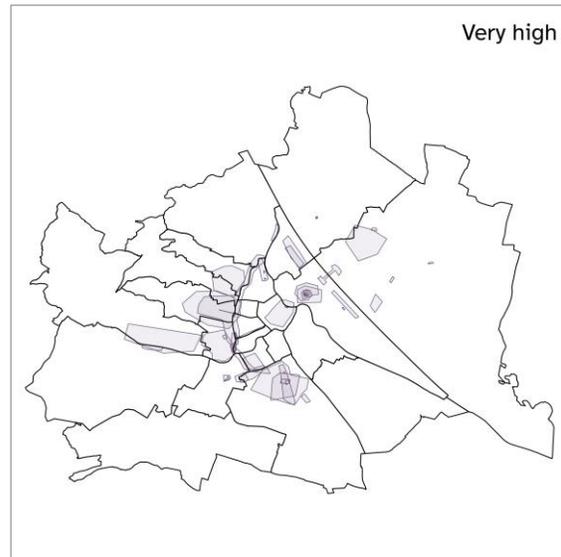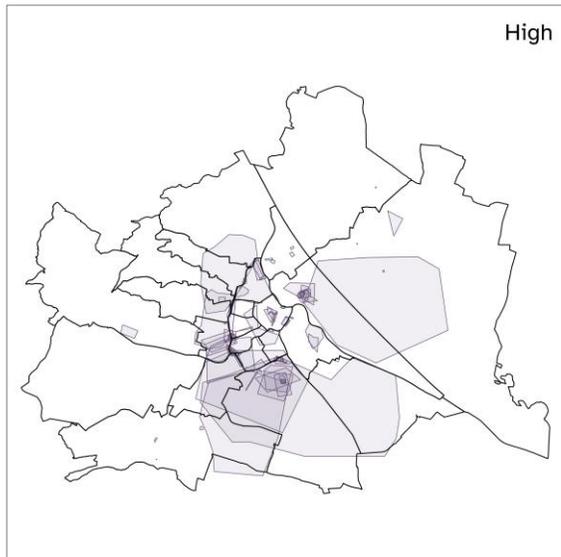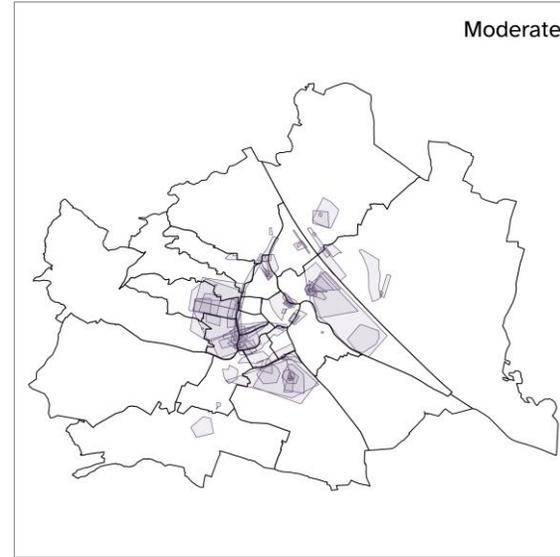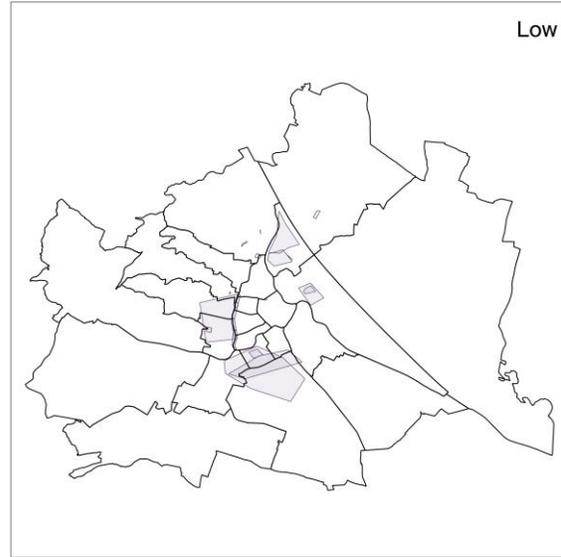
universität wien   ÖE ÓBUDAI EGYETEM ÓBUDA UNIVERSITY   FWF Austrian Science Fund   NATIONAL RESEARCH, DEVELOPMENT AND INNOVATION OFFICE HUNGARY
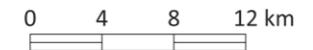
2.3 Personal crime experience and feeling of safety

This section examines how individual experiences with crime and feelings of vulnerability influence perceptions of safety in Vienna. The analysis compares responses from participants who have experienced violent or property crimes with those who have not, highlighting how these experiences shape the way different areas are perceived as safe or unsafe. In addition, the section visualizes how participants' self-reported feelings of insecurity relate to their spatial perception of crime.

Content:

- Perceived safe and unsafe areas by participants with or without previous violent crime experience GO

- Perceived safe and unsafe areas by participants with or without previous property crime experience GO

- Perceived safe and unsafe areas according to frequency of insecurity feelings GO

2. CRIME PERCEPTION IN **VIENNA, AUSTRIA**

2.3 Personal crime experience and feeling of safety

Perceived safe and unsafe areas by participants with or without previous violent crime experience

Experiencing violent crime can significantly influence how people shapes perceptions of safety. Participants were asked the question: "**Have you ever experienced a violent crime?**"

As shown in the graph, most respondents (90 participants) reported that they had not experienced a violent crime, while 27 participants indicated that they had been victims. A small group (6 participants) preferred not to answer.
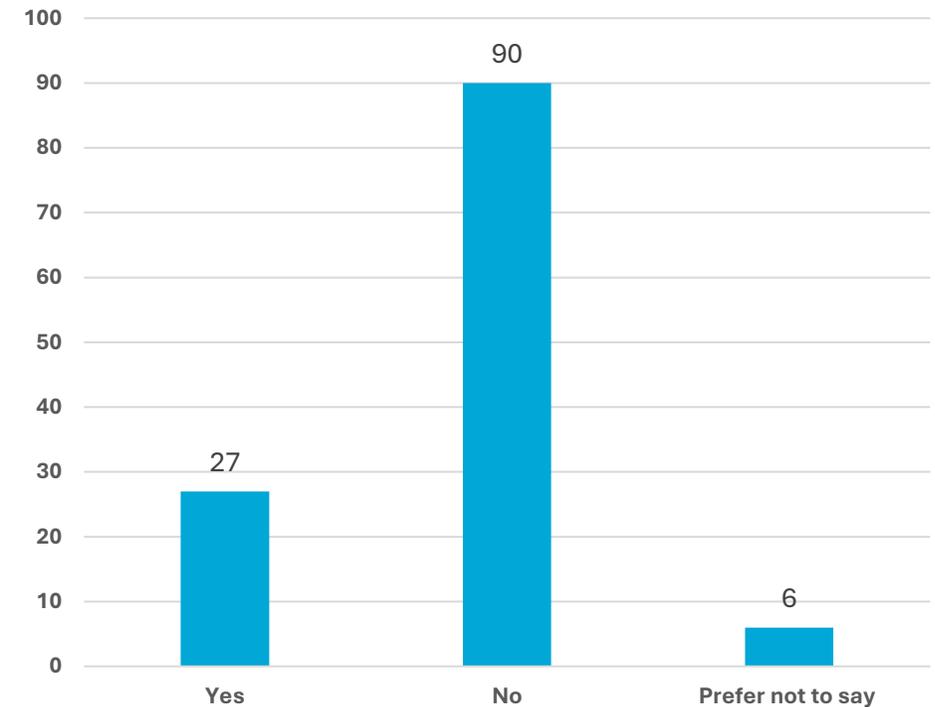
Perceived safe and unsafe areas by participants with previous violent crime experience
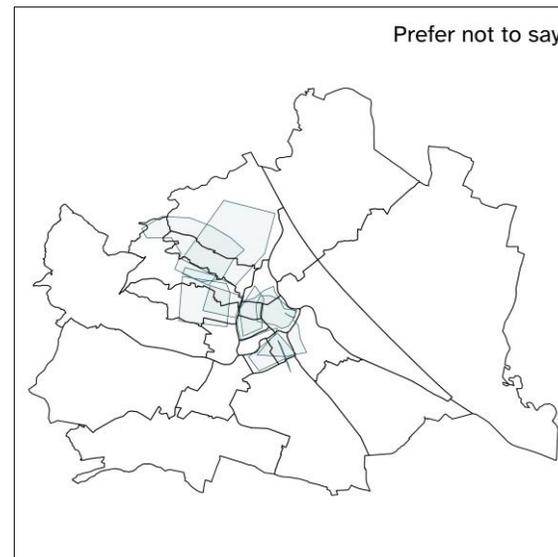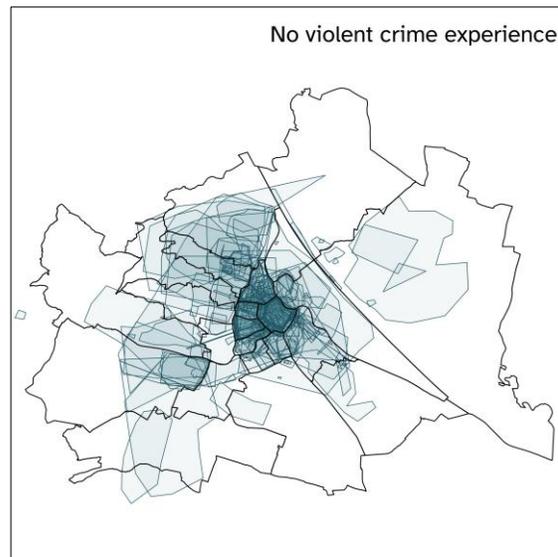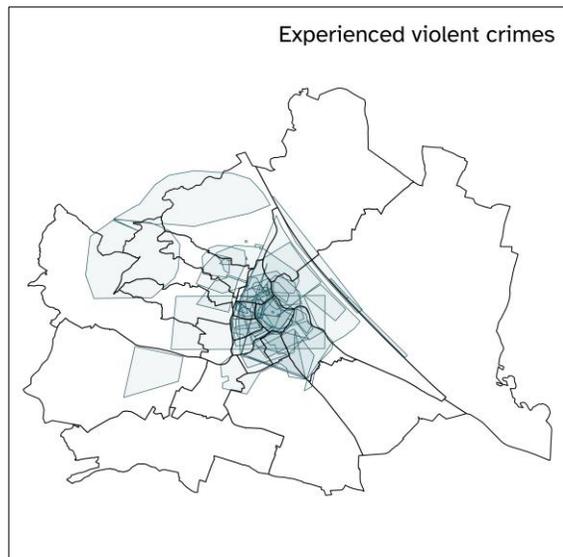
Experienced violent crimes | No violent crime experience | Prefer not to say

☐ Perceived safe areas

☐ District boundary

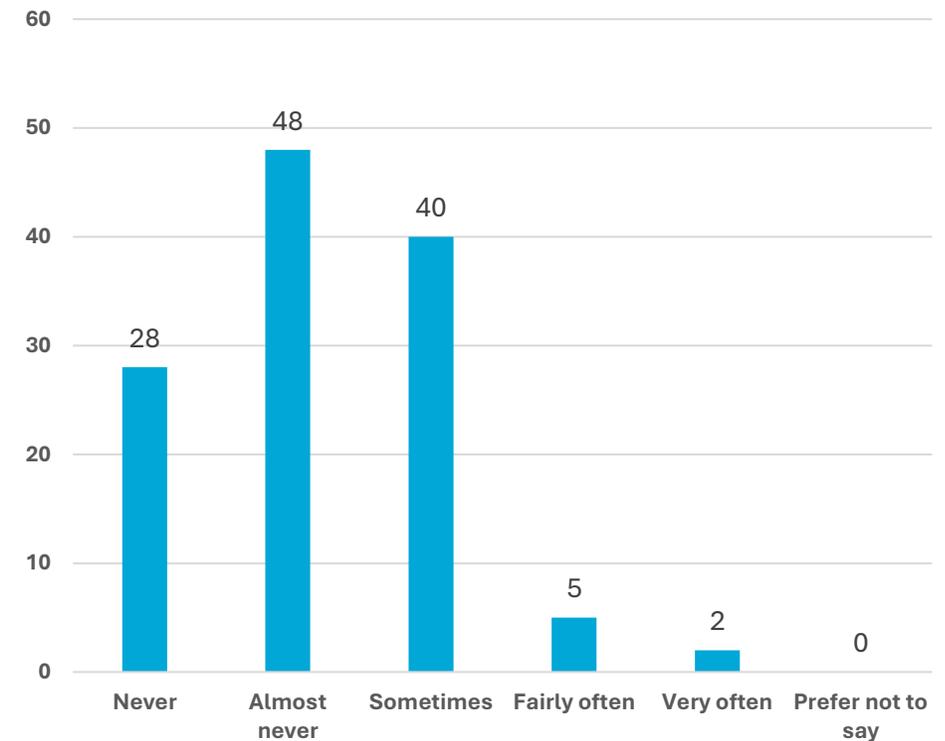☐ Perceived unsafe areas

☐ District boundary

0   4   8   12 km
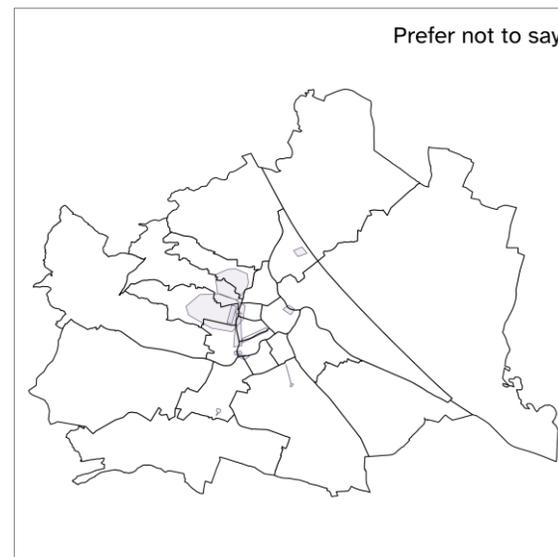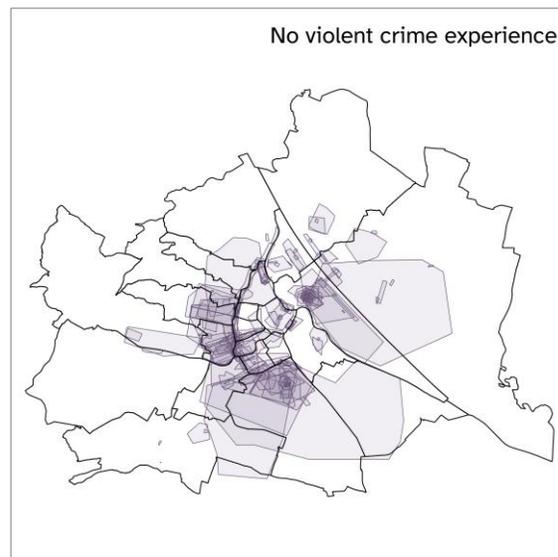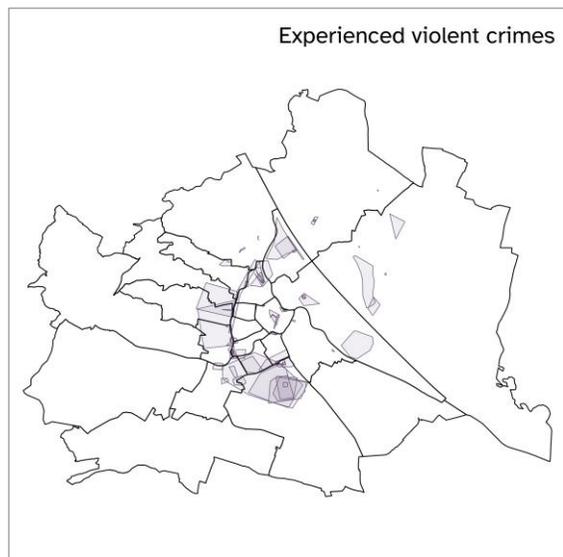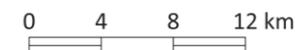
2. CRIME PERCEPTION IN **VIENNA, AUSTRIA**

2.3 Personal crime experience and feeling of safety

Perceived safe and unsafe areas by participants with or without previous property crime experience

Personal experience with property crime can shape how individuals perceive safety in their surroundings. To better understand this relationship, participants in Vienna were asked:
"**Have you ever experienced a property crime?**"
As shown in the graph, 79 participants indicated that they had not experienced property crime, while 41 participants responded that they had.
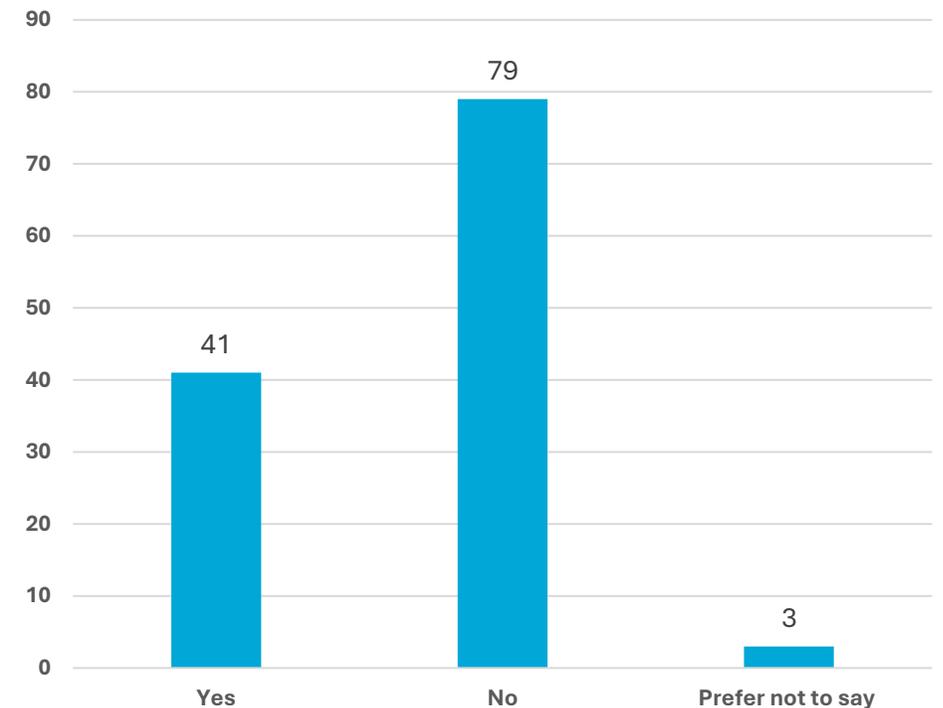
Perceived safe and unsafe areas by participants with previous property crime experience
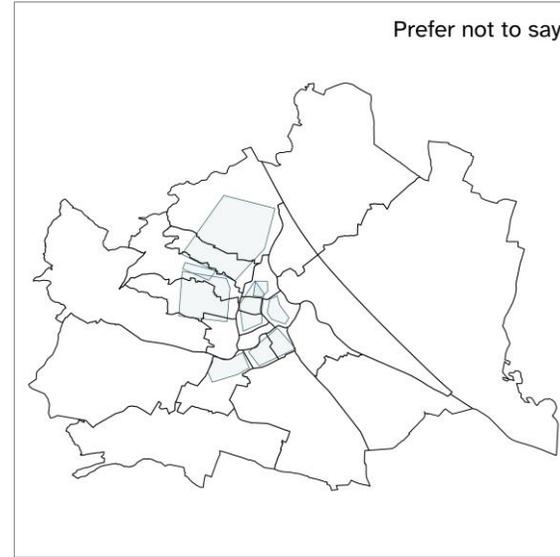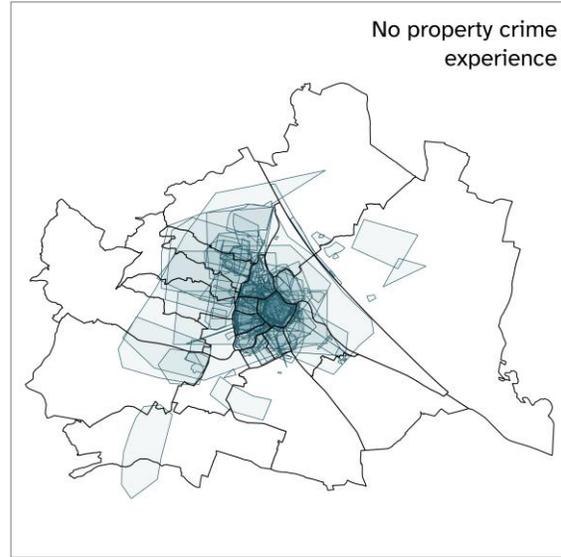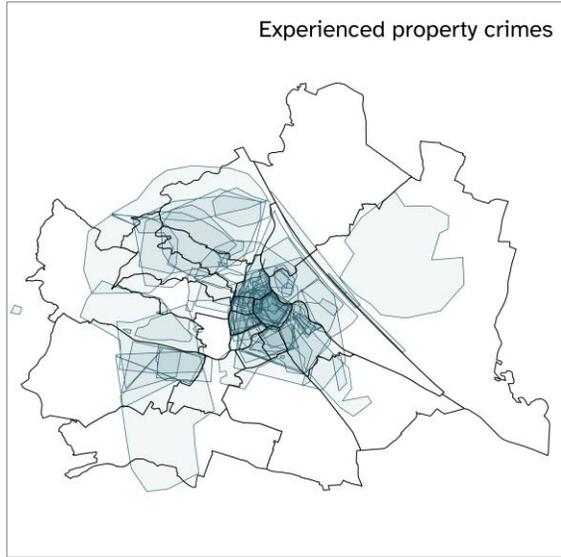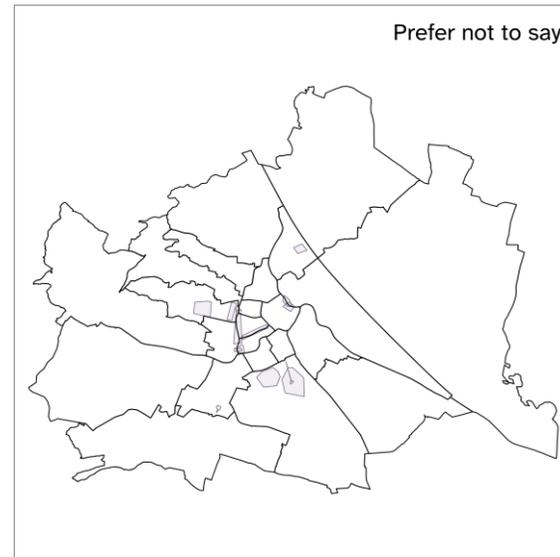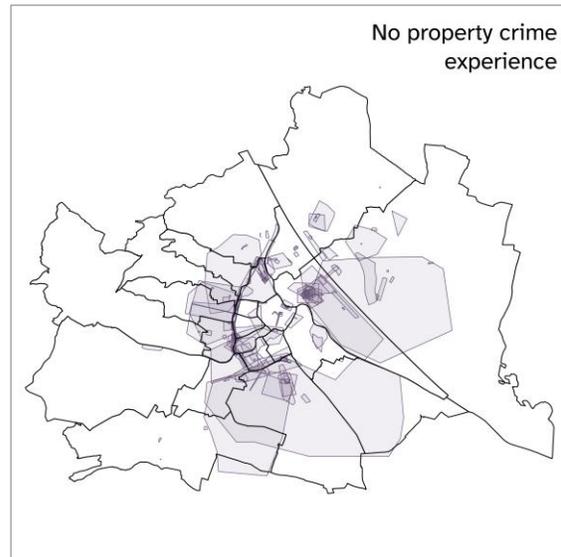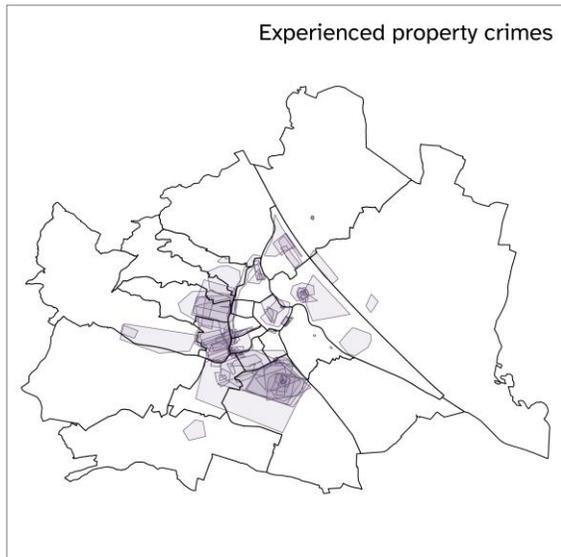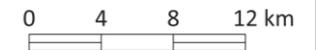
2. CRIME PERCEPTION IN **VIENNA, AUSTRIA**

2.3 Personal crime experience and feeling of safety

Perceived safe and unsafe areas according to frequency of insecurity feelings

Participants were also asked about their recent emotional experiences related to safety with the question: "**In the past month, how often have you experienced feelings of insecurity or vulnerability?**"
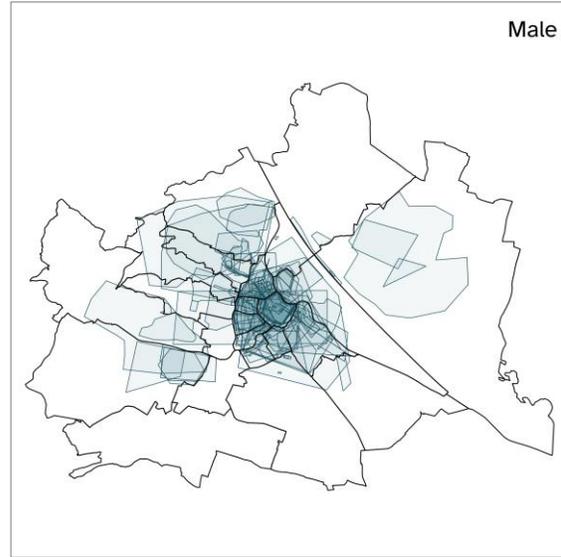
As shown in the graph, most participants reported experiencing feelings of insecurity or vulnerability only occasionally or rarely. A smaller portion of respondents indicated that they often or very often felt insecure.

Perceived safe areas according to frequency of insecurity feelings

Index

Perceived safe areas

District boundary

0   4   8   12 km

Perceived unsafe areas according to frequency of insecurity feelings

Never

Almost never

Sometimes

Fairly often

Very often

Perceived unsafe areas

District boundary

0　4　8　12 km
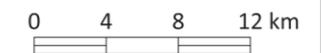
2.4 Crime perception by demographics

This section looks at how perceptions of safety in Vienna may vary across different segments of the population. The analysis considers participants' **gender**, **age**, and **length of time living in the city**, offering insight into how personal and demographic factors might influence the way people experience and interpret safety in their urban environment.

Content:

- Perceived safe and unsafe areas by gender GO

- Perceived safe and unsafe areas by age range GO
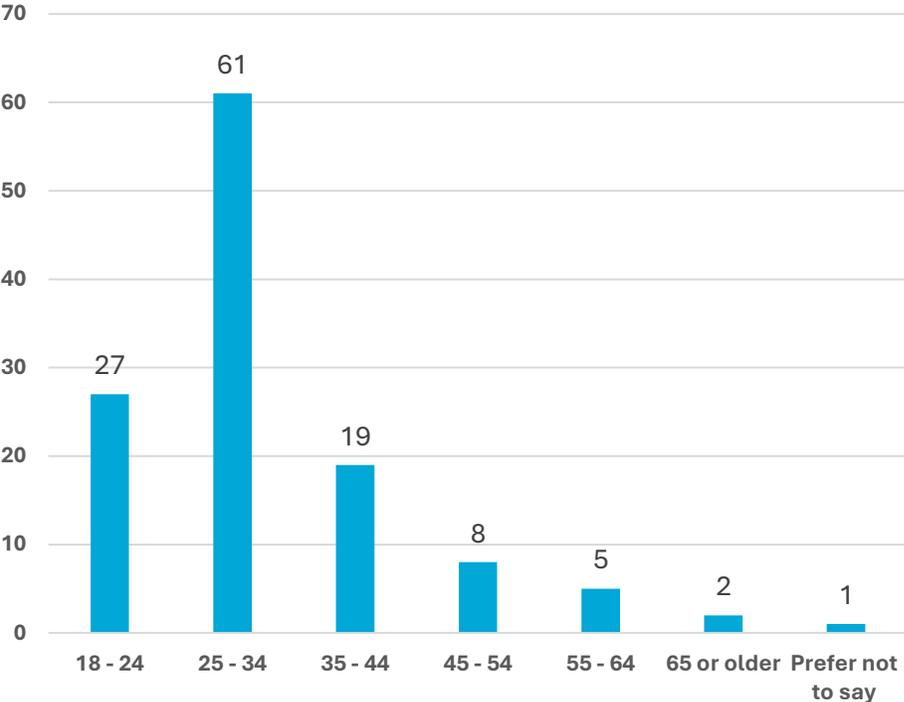
- Perceived safe and unsafe areas by length of residency GO

2. CRIME PERCEPTION IN **VIENNA, AUSTRIA**

2.4 Crime perception by demographics

Perceived safe and unsafe areas by gender

Gender can influence how individuals perceive and experience safety in urban environments.

In this study, the vast majority of participants identified as either women (56) or men (64), while a small number chose not to disclose this information.

The following maps illustrate how perceptions of safe and unsafe areas may differ by gender.
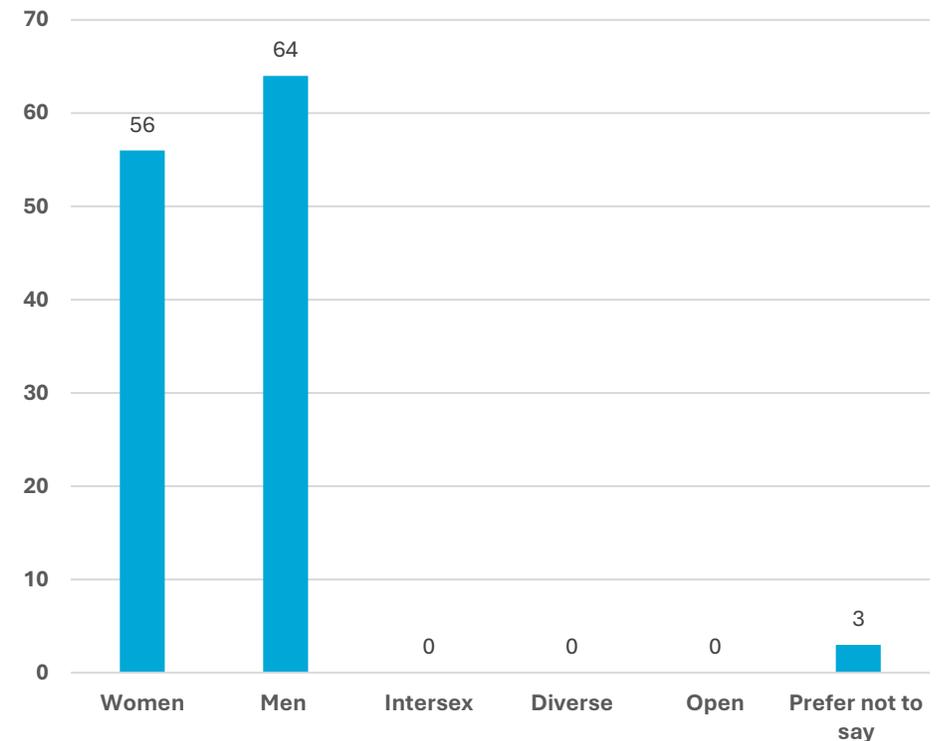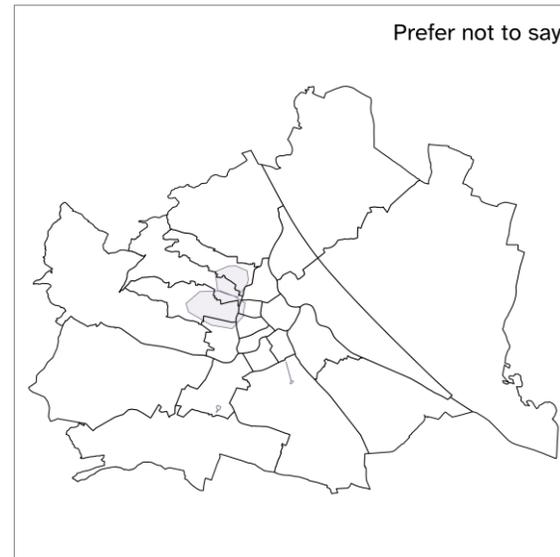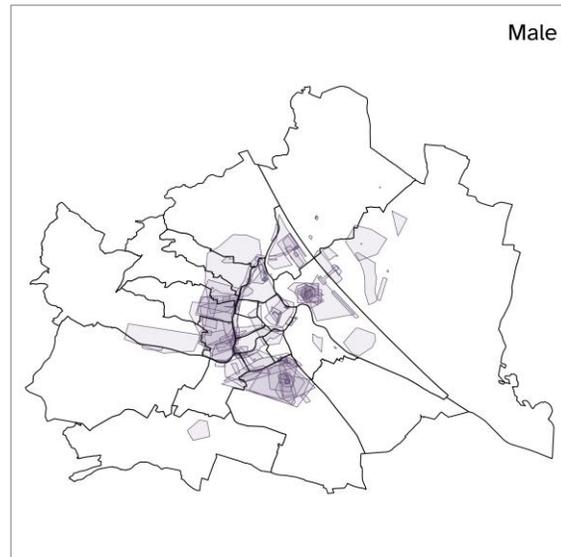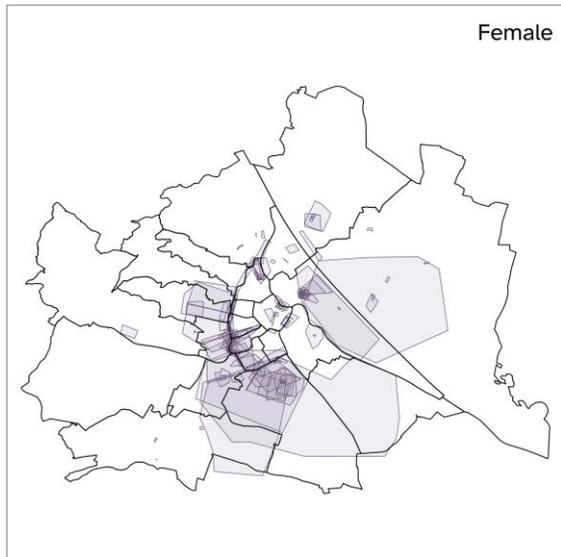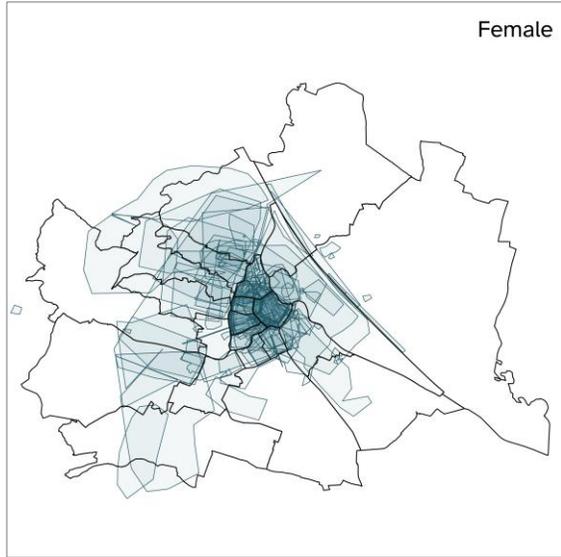
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Perceived safe and unsafe areas by gender
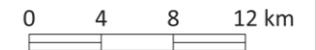
2. CRIME PERCEPTION IN **VIENNA, AUSTRIA**

2.4 Crime perception by demographics

Perceived safe and unsafe areas by age range

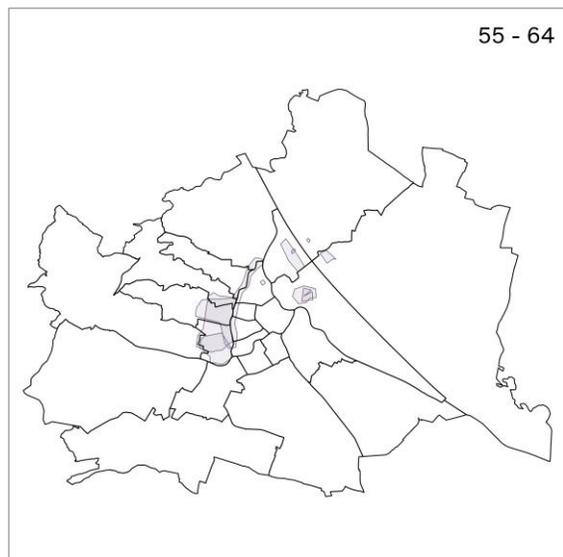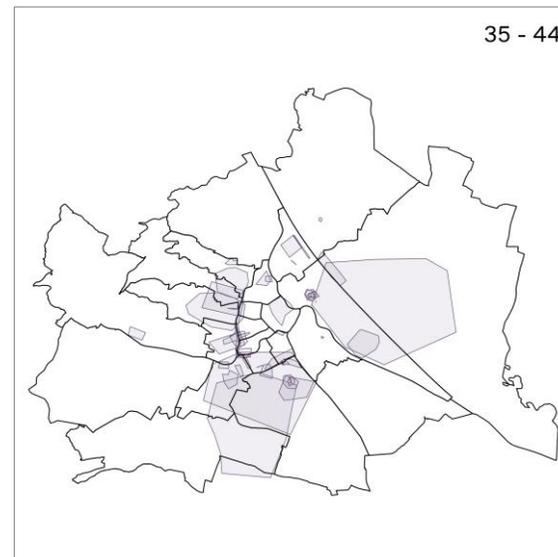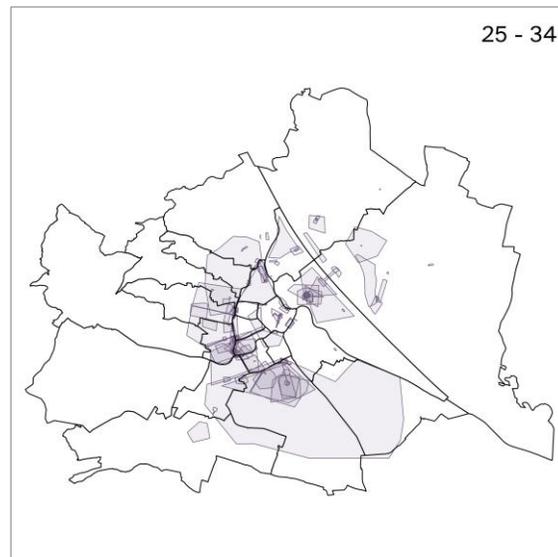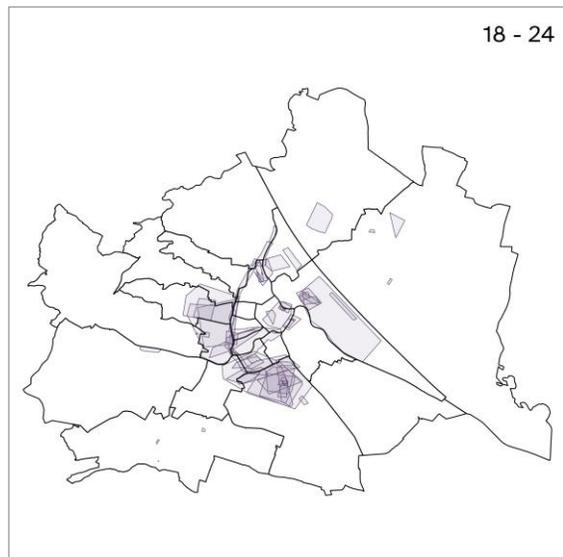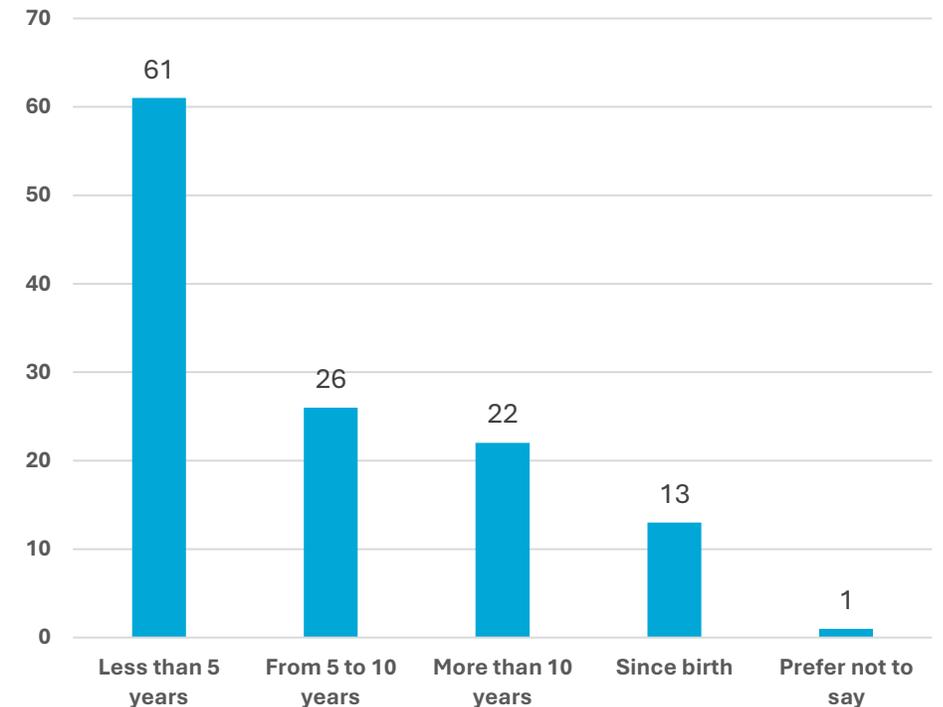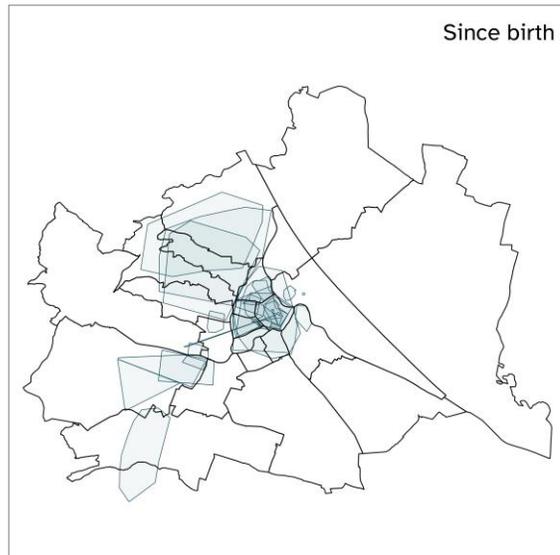Age is another factor that may shape how individuals perceive and respond to safety in urban environments.

As the graph shows, younger participants, particularly those aged **25 to 34**, make up the largest share of the sample, followed by the 18 to 24 and 35 to 44 age groups. Older age groups are less represented.

Perceived safe areas by age range
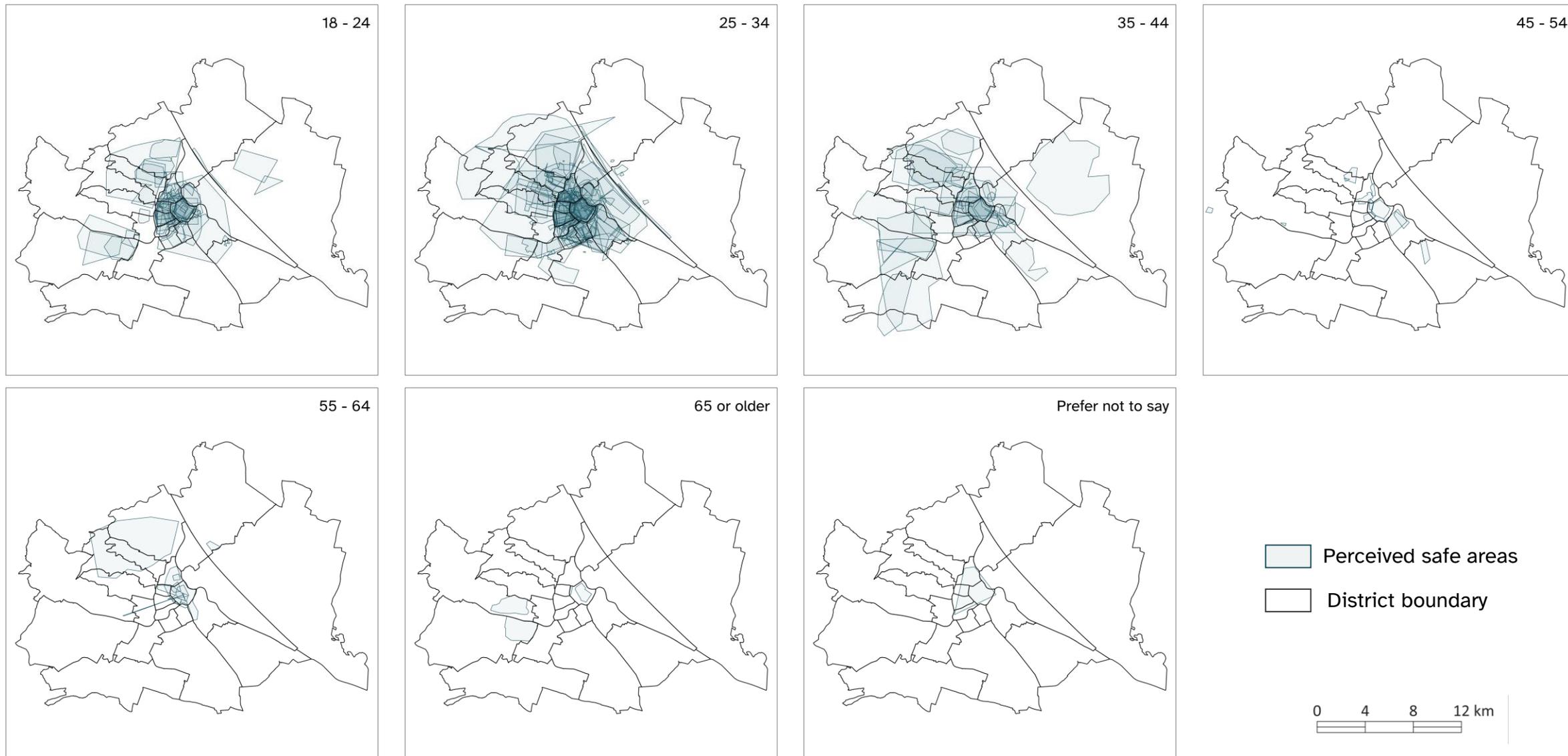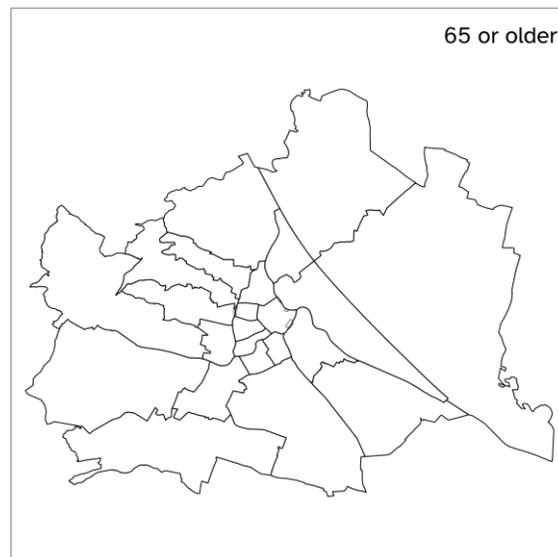
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Perceived unsafe areas by age range

18 - 24

25 - 34

35 - 44

45 - 54

55 - 64

65 or older

Perceived unsafe areas

District boundary

0   4   8   12 km

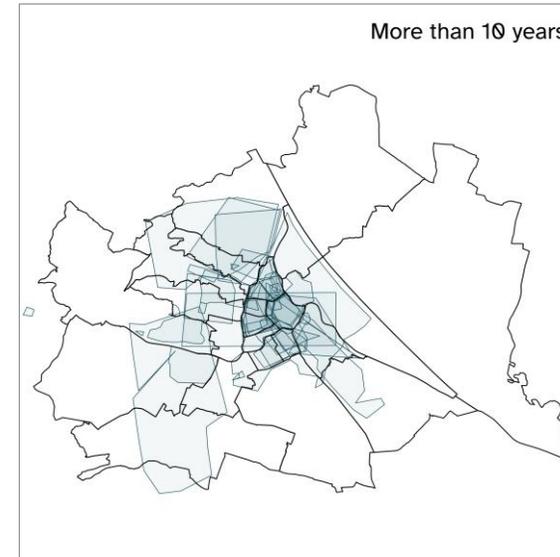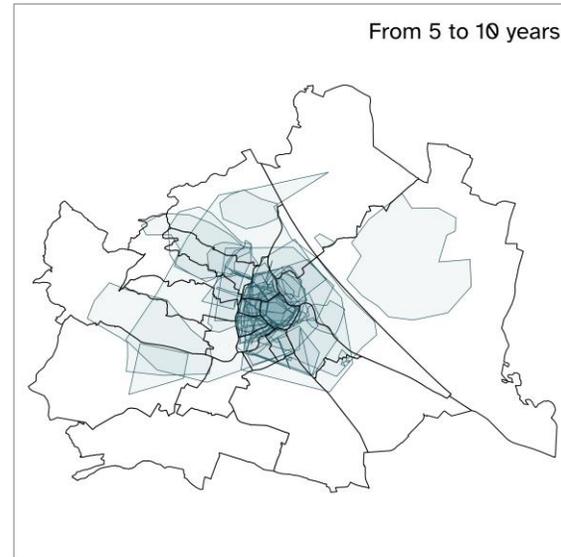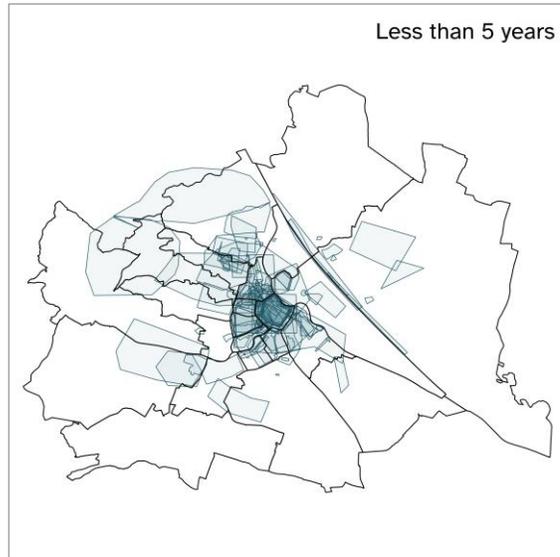## 2. CRIME PERCEPTION IN **VIENNA, AUSTRIA**

2.4 Crime perception by demographics

Perceived safe and unsafe areas by length of residency

The survey captured a diverse range of residency durations among participants in Vienna. Most respondents have lived in the city for **less than five years**, while others reported residing in Vienna for longer periods, including more than a decade or since birth. This variation in length of residency provides an opportunity to explore how familiarity with the city and duration of exposure to its urban environment may influence perceptions of safety and insecurity.
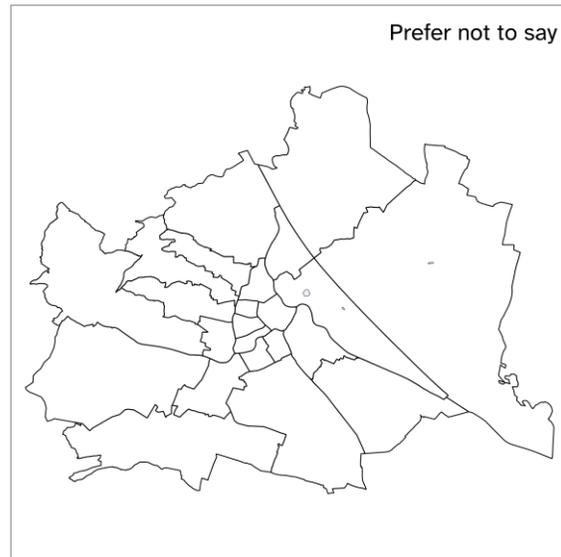
Bar chart — values by length of residency:
- Less than 5 years: 61
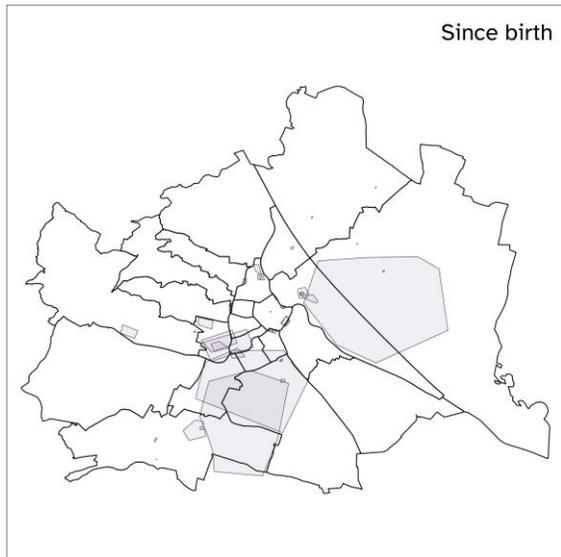- From 5 to 10 years: 26
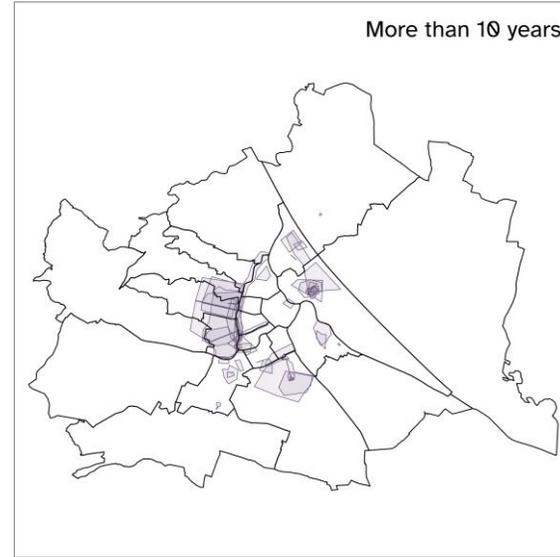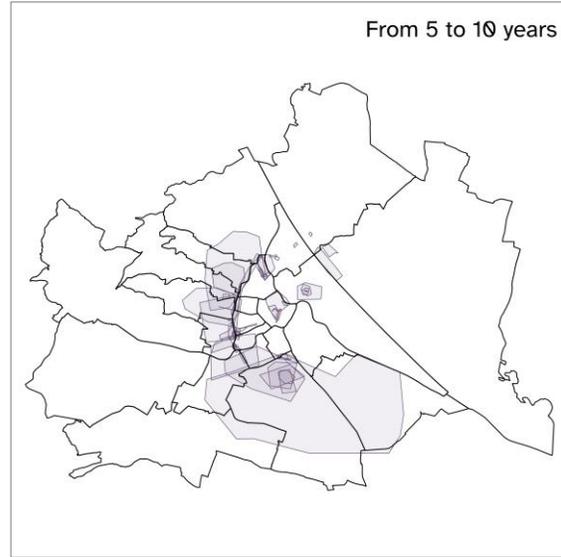- More than 10 years: 22
- Since birth: 13
- Prefer not to say: 1

Perceived safe areas by length of residency

Perceived unsafe areas by length of residency

Less than 5 years

From 5 to 10 years

More than 10 years

Since birth

Prefer not to say

Perceived unsafe areas

District boundary

0   4   8   12 km

2.5 Collective perception of safety (grid-based analysis)

To analyze the sketched polygons, an hexagonal grids was generated to spatially segment the city. Each hexagonal cell covers an area of approximately 0.15 km^2, comparable to the size of a neighborhood. The centroids of the hexagonal cells were calculated and used as reference points for the analysis. The count of polygons intersecting each centroid was used to determine how many times each cell was identified as safe or unsafe.
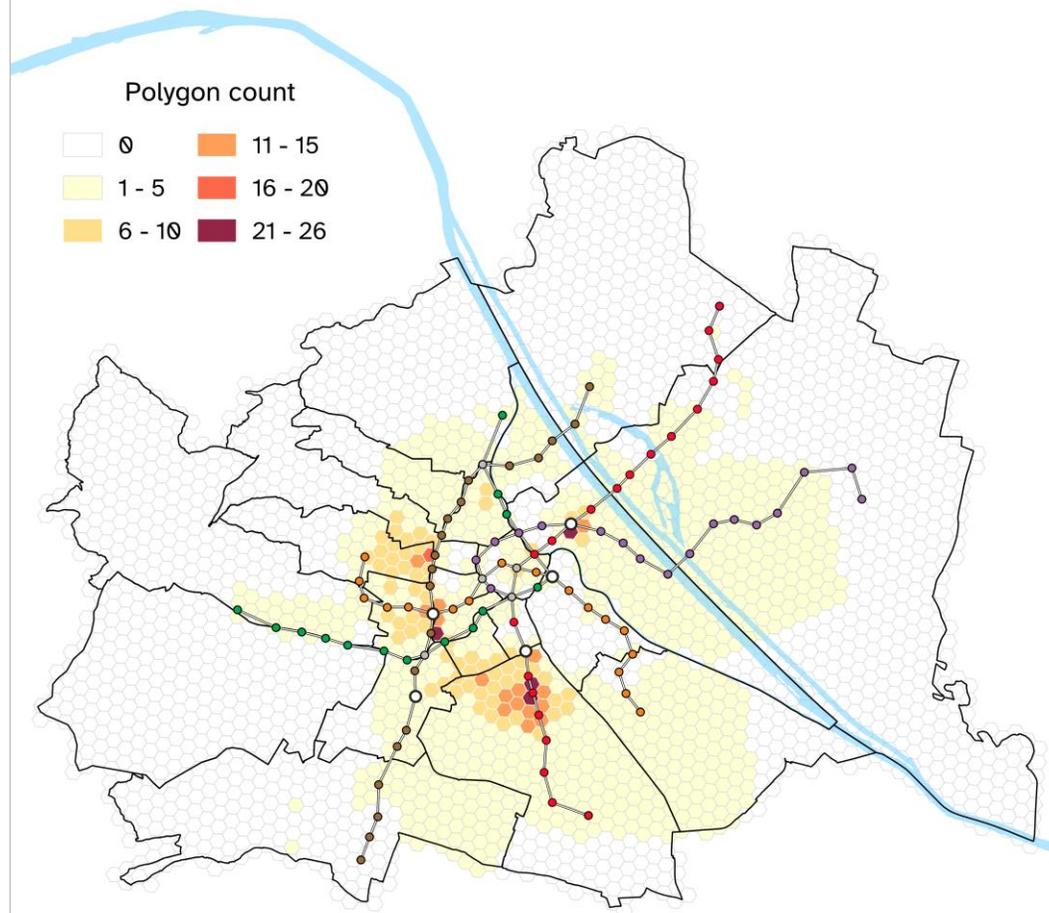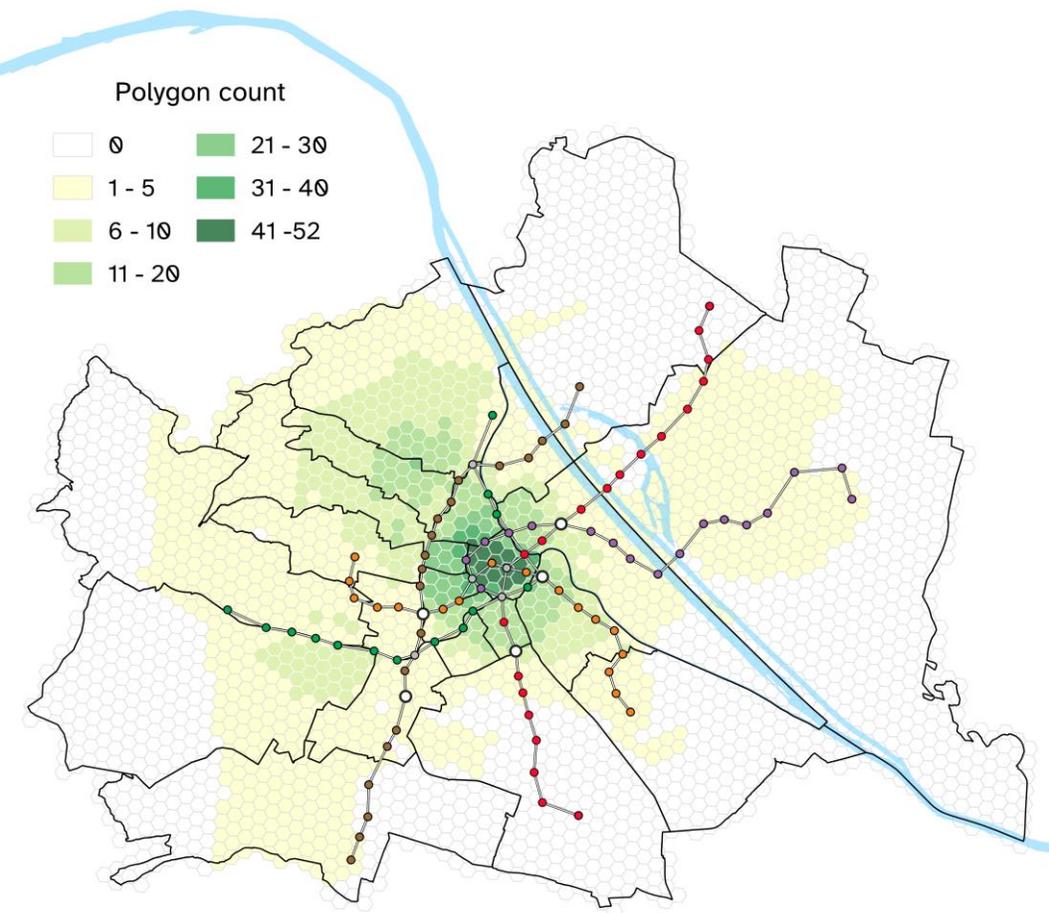
Content:

- Perceived safe and unsafe areas (grid view)   GO

- Detected patterns of perceived safety and insecurity (Binomial test)   GO

- Spatial Crime Perception Gap (SCPG)   GO

Perceived safe and unsafe areas (grid view)

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Perceived **safe** areas

Perceived **unsafe** areas

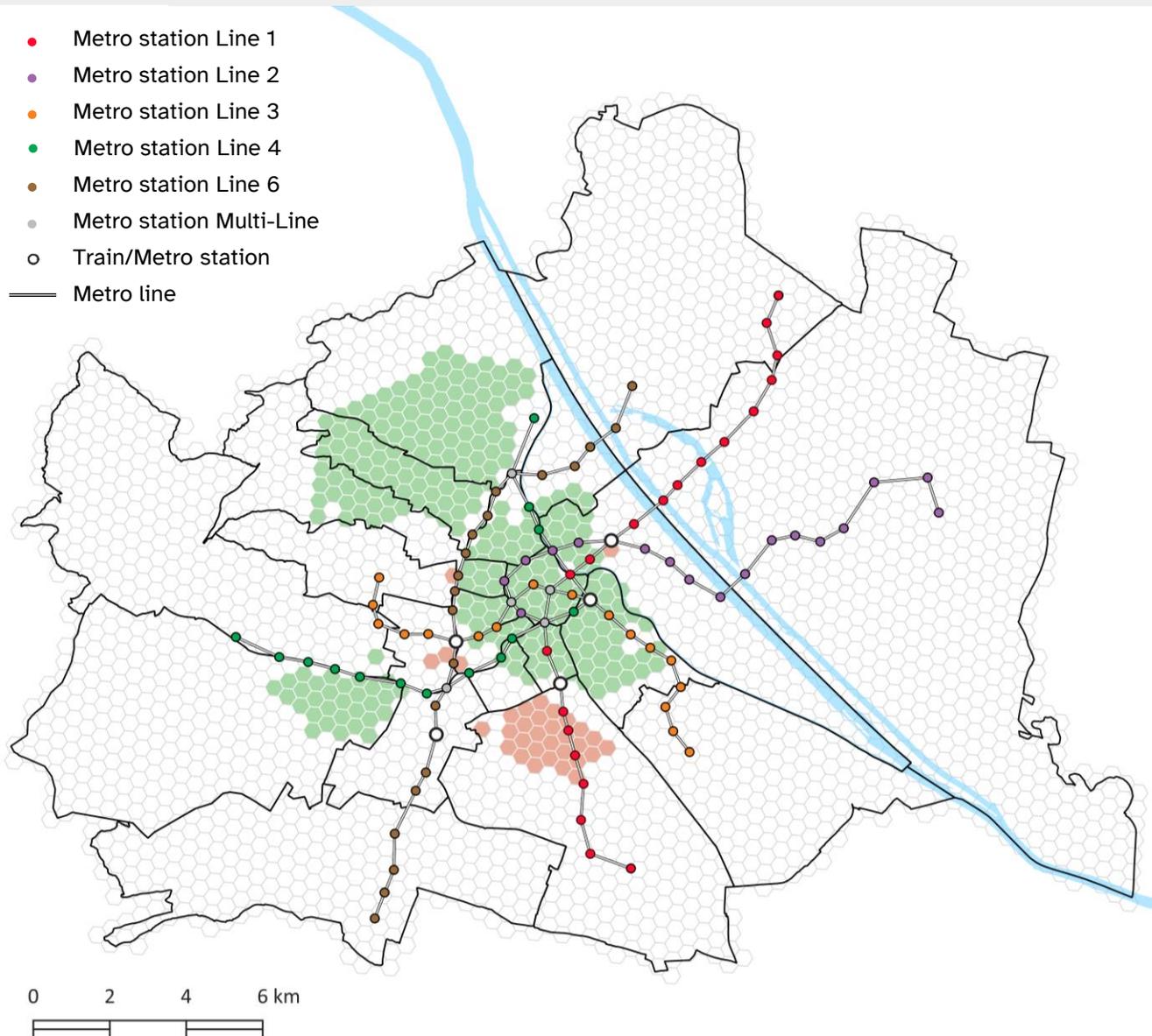Detected patterns of perceived safety and insecurity (Binomial test)

Index

Legend:
- Metro station Line 1
- Metro station Line 2
- Metro station Line 3
- Metro station Line 4
- Metro station Line 6
- Metro station Multi-Line
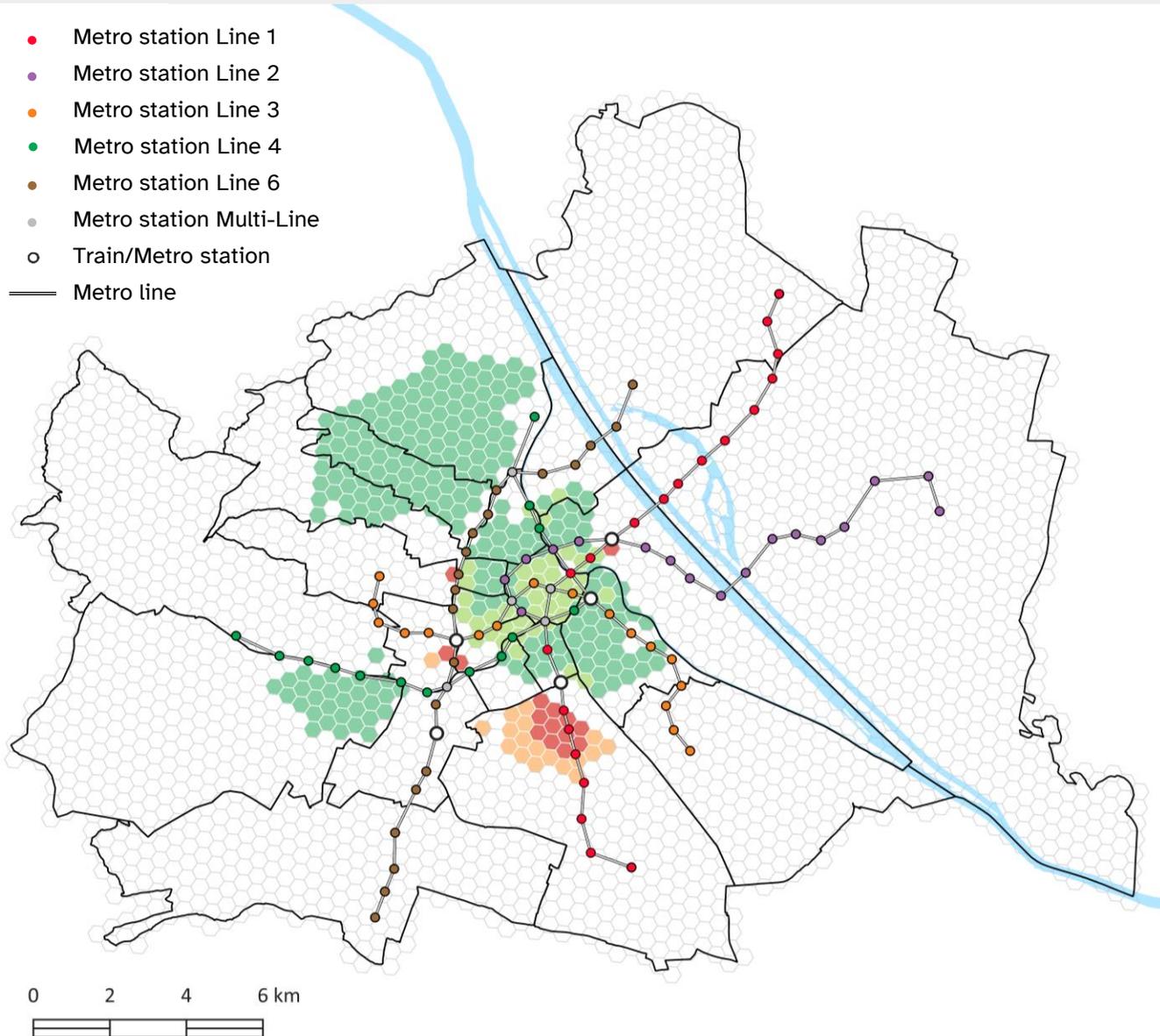- Train/Metro station
- Metro line

To identify areas that were distinctly perceived as safe or unsafe, a statistical approach known as the **binomial test** was applied. This method assesses whether the number of participants marking a particular area as safe or unsafe is high enough to be considered statistically relevant.

For each hexagonal cell, the test evaluated the frequency with which it was marked as safe or unsafe. If a clear pattern emerged, and the difference was strong enough to exceed a statistical threshold, the area was classified as **significant**.

The hexagons were then grouped into three categories:
- **Perceived Safe**: significantly more safe markings than unsafe.
- **Perceived Unsafe**: significantly more unsafe markings than safe.
- **Not Significant**: no strong difference, perceptions were mixed or unclear.

0   2   4   6 km

Spatial Crime Perception Gap (SCPG)

Legend

- Metro station Line 1
- Metro station Line 2
- Metro station Line 3
- Metro station Line 4
- Metro station Line 6
- Metro station Multi-Line
- Train/Metro station
- Metro line

Similar to Budapest, to examine the **spatial crime perception gap** in Vienna, we compared areas perceived as safe or unsafe (identified through the binomial test) with a reference map generated from crime data using **spatial autocorrelation** analysis, which highlights areas of high and low crime intensity.

By overlaying these two layers, the perception map and the crime data, we identified where public perceptions aligned with actual crime patterns and where they diverged. Each hexagonal cell was then categorized into one of the following types:

REFERENCE

		SAFE	UNSAFE
PERCEPTION	SAFE	Accurate perception as safe areas (AS)	Inaccurate perception as safe areas (IS)
	UNSAFE	Inaccurate perception as unsafe areas (IU)	Accurate perception as unsafe areas (AU)

0   2   4   6 km

2.6 Urban conditions associated with safety perceptions

Once participants marked areas they considered safe or unsafe on the map of Vienna they were asked to select from a list of urban features that they felt best described those locations. These features included aspects such as quality of street lighting, presence of surveillance or security personnel, condition of public spaces and infrastructure, levels of noise pollution, overall community perception of safety, and social issues like gang activity or drug presence. Participants were allowed to select more than one characteristic per area.

Content:

- Collective perception of safety and public lighting conditions   GO
- Collective perception of safety and surveillance presence   GO
- Collective perception of safety and surroundings maintenance   GO
- Collective perception of safety and infrastructure conditions   GO
- Collective perception of safety and levels of noise pollution   GO
- Collective perceptions of safety and general safety perception   GO
- Collective perceptions of safety and social concerns   GO

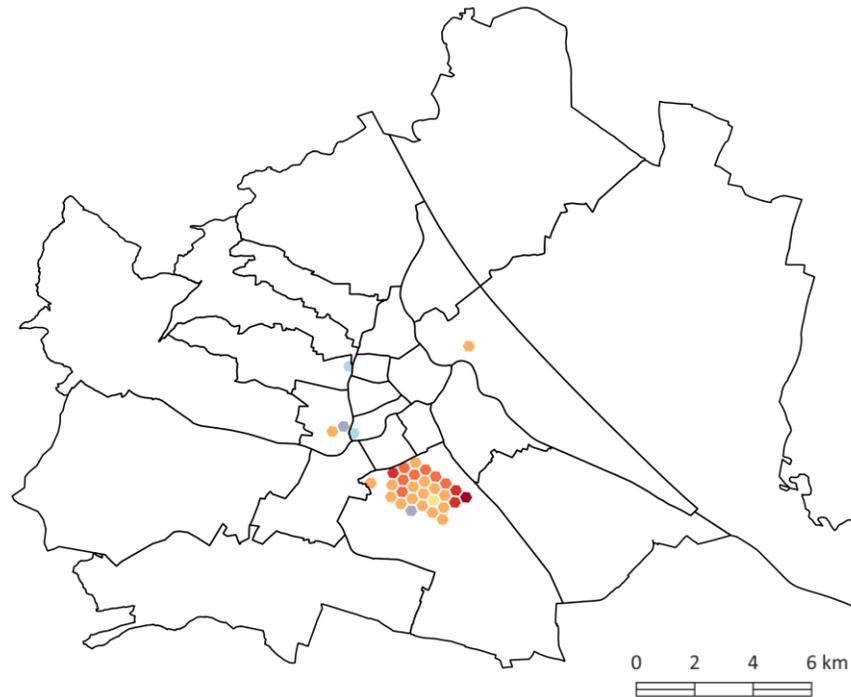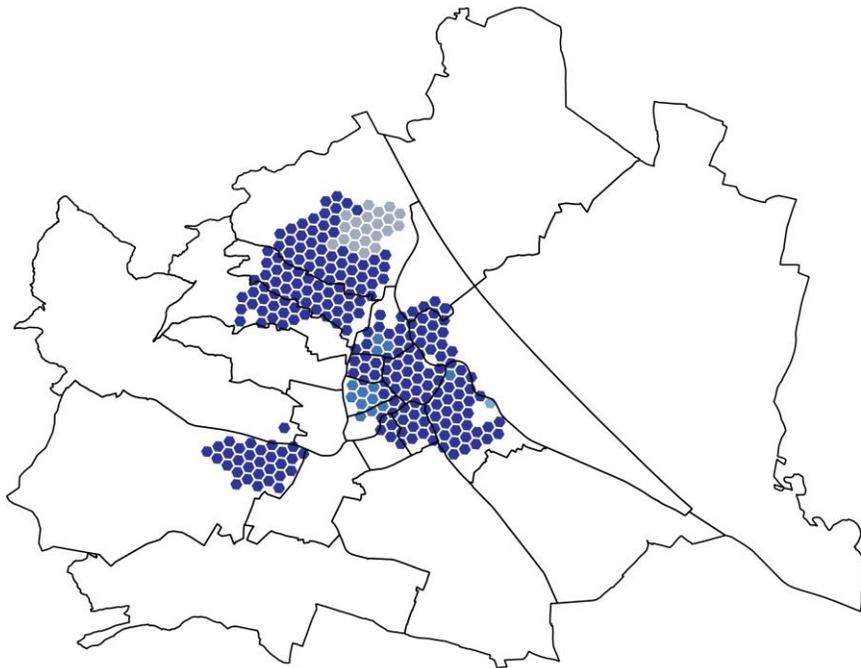Collective perception of safety and public lighting conditions
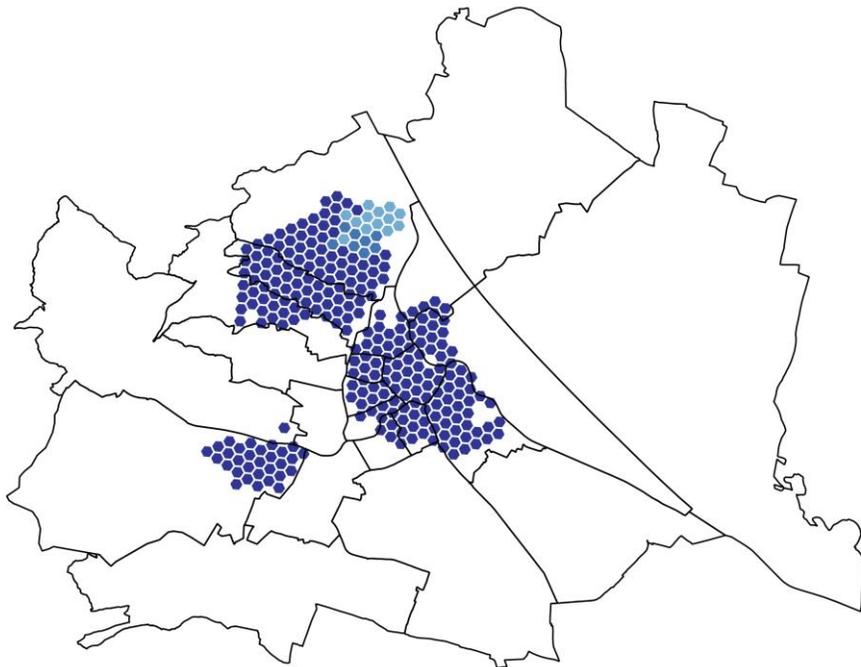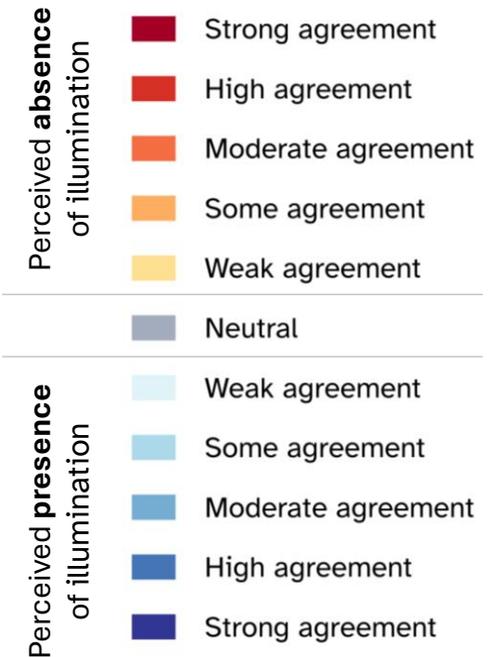
Participants had the option to indicate whether an area was well illuminated or lacked sufficient street lighting.

Collective perception of safety and surveillance presence
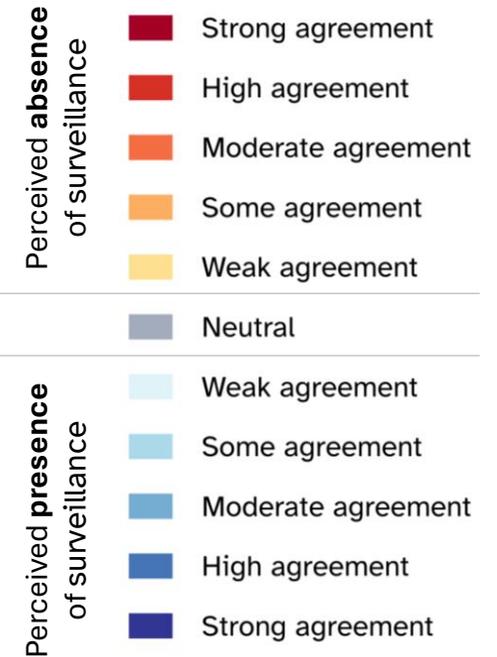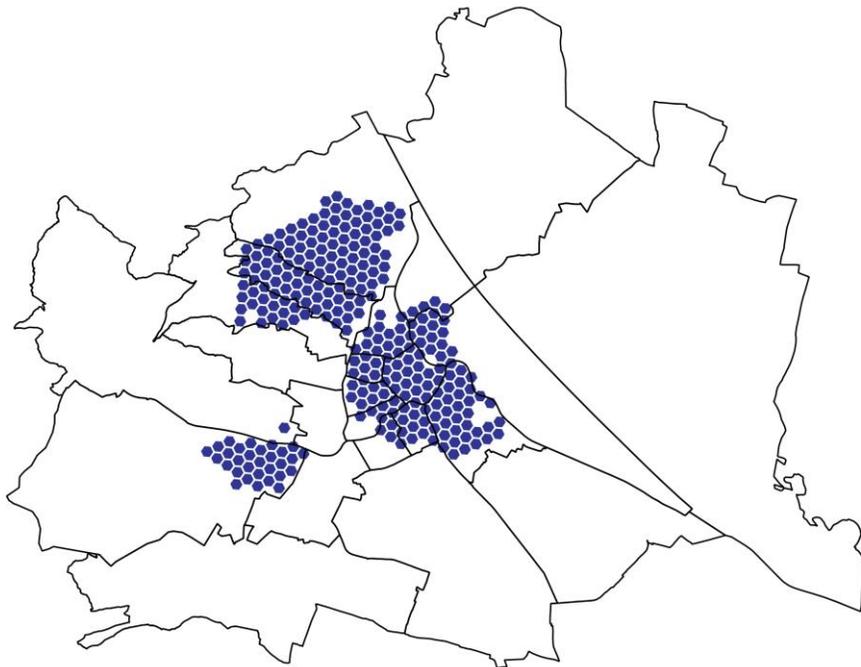
Perceived safe areas

Perceived unsafe areas

Perceived **absence** of surveillance
- Strong agreement
- High agreement
- Moderate agreement
- Some agreement
- Weak agreement

Neutral

Perceived **presence** of surveillance
- Weak agreement
- Some agreement
- Moderate agreement
- High agreement
- Strong agreement

0   2   4   6 km

Participants could indicate whether the area was monitored by security personnel or surveillance systems such as police, CCTV cameras, or street patrols.

Collective perception of safety and surroundings maintenance
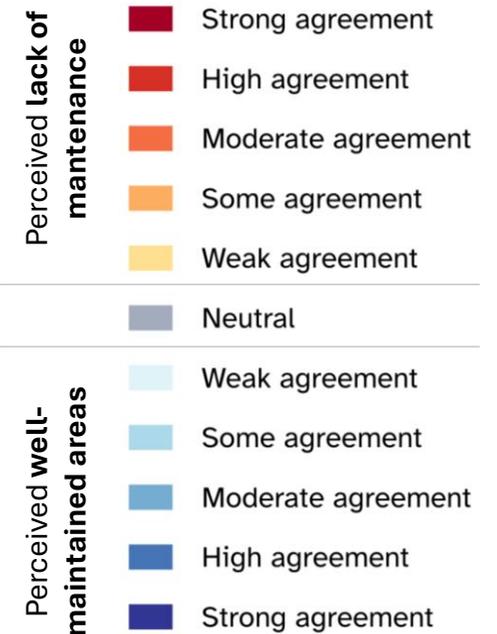
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Respondents could indicate whether the area was properly maintained (clean and litter-free) or poorly maintained, with graffiti, trash, or overgrown vegetation.

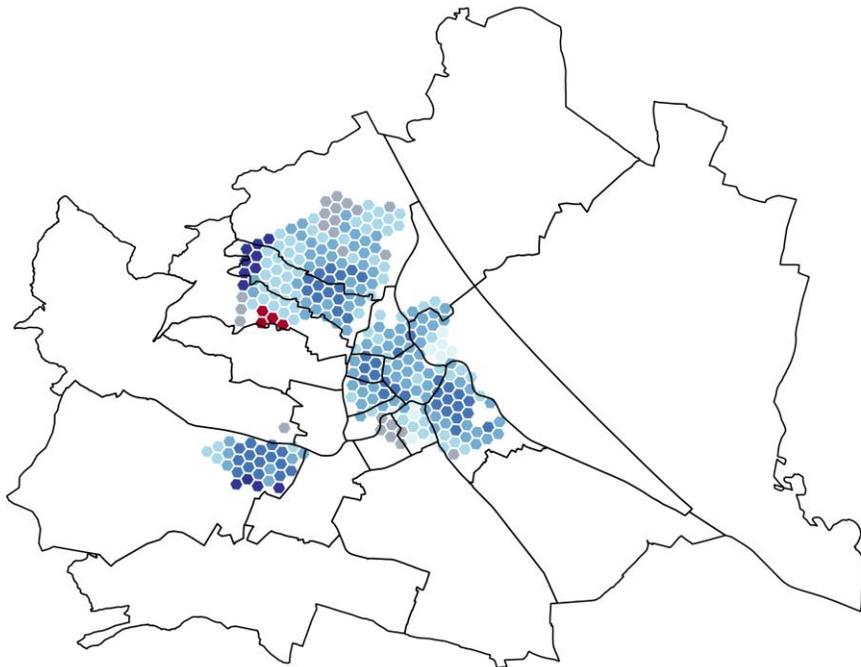## Collective perception of safety and infrastructure conditions

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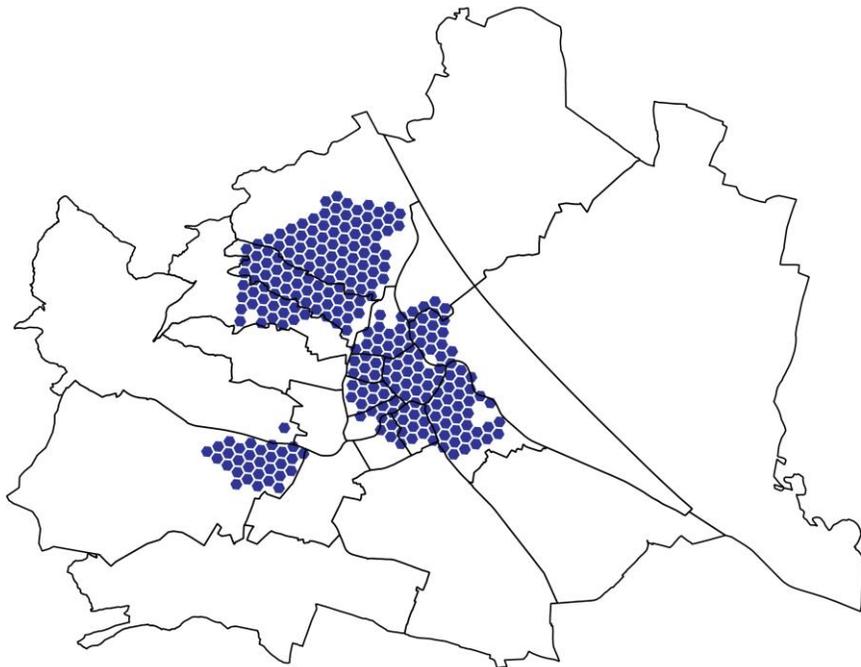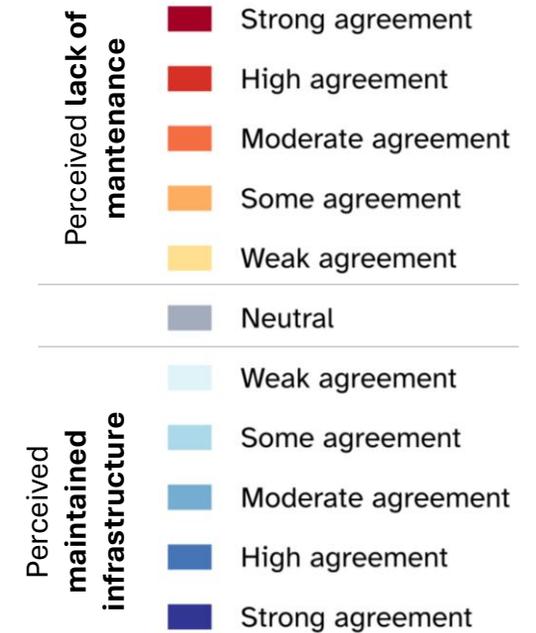
Participants could indicate whether infrastructure in the area, such as roads, buildings, and parks, was in good condition or showed signs of deterioration.
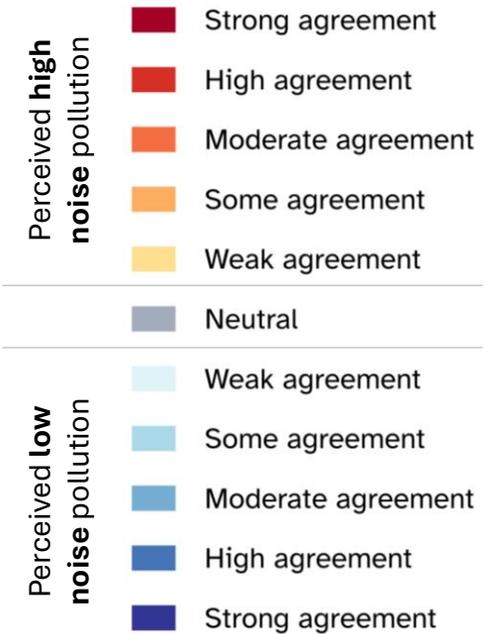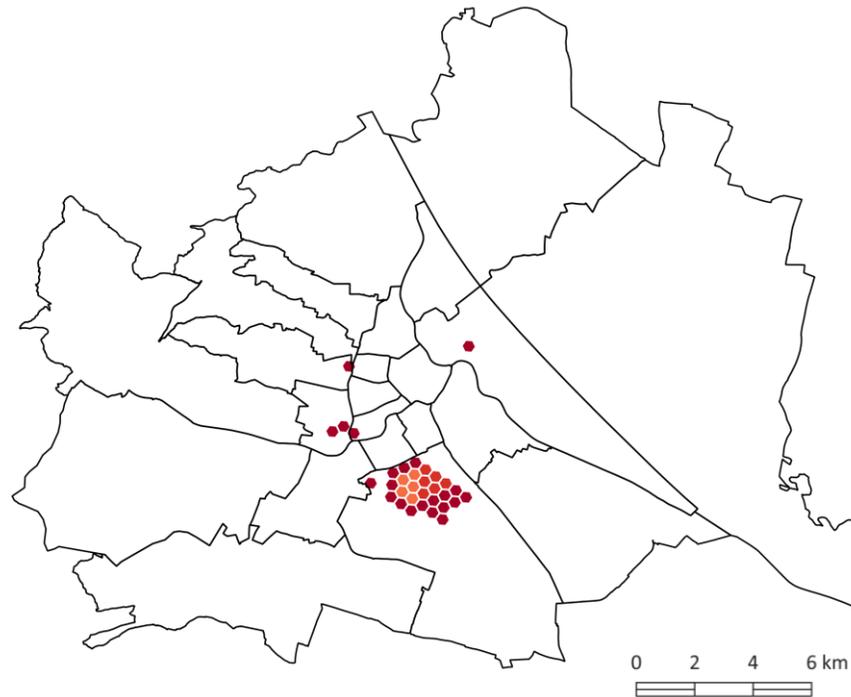
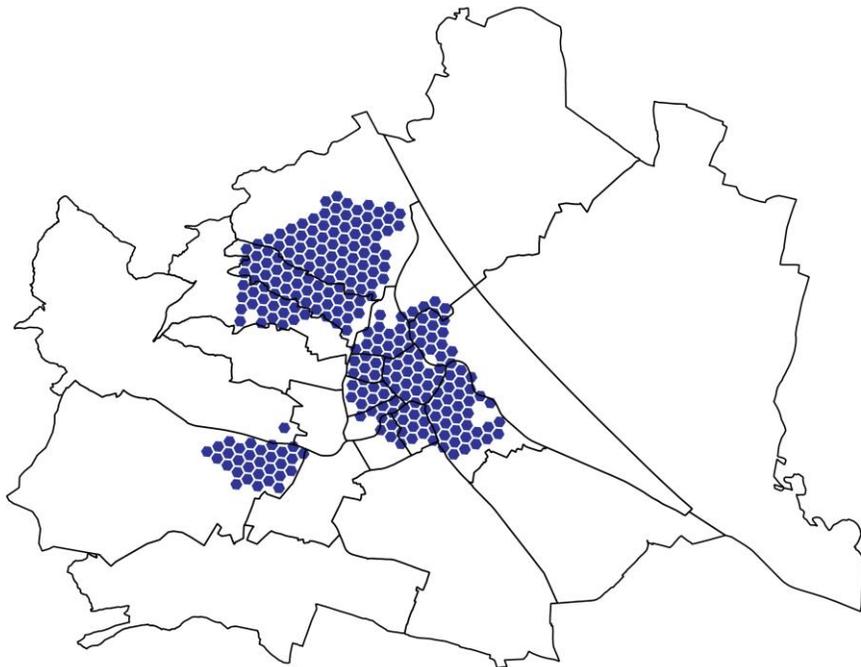# Collective perception of safety and levels of noise pollution

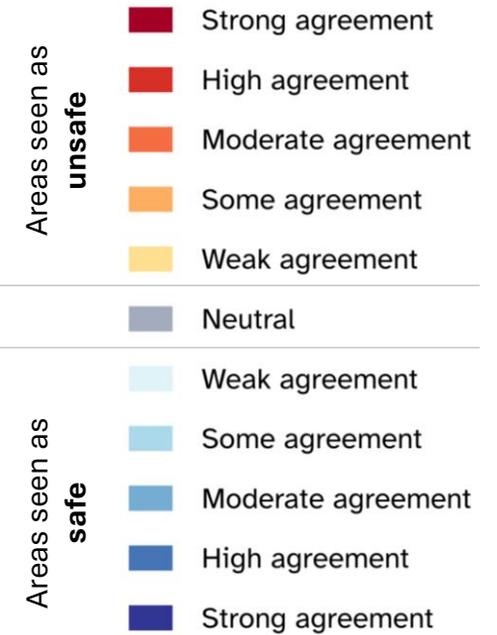Respondents could indicate if the area was usually characterized by low noise levels or frequent noise disturbances.

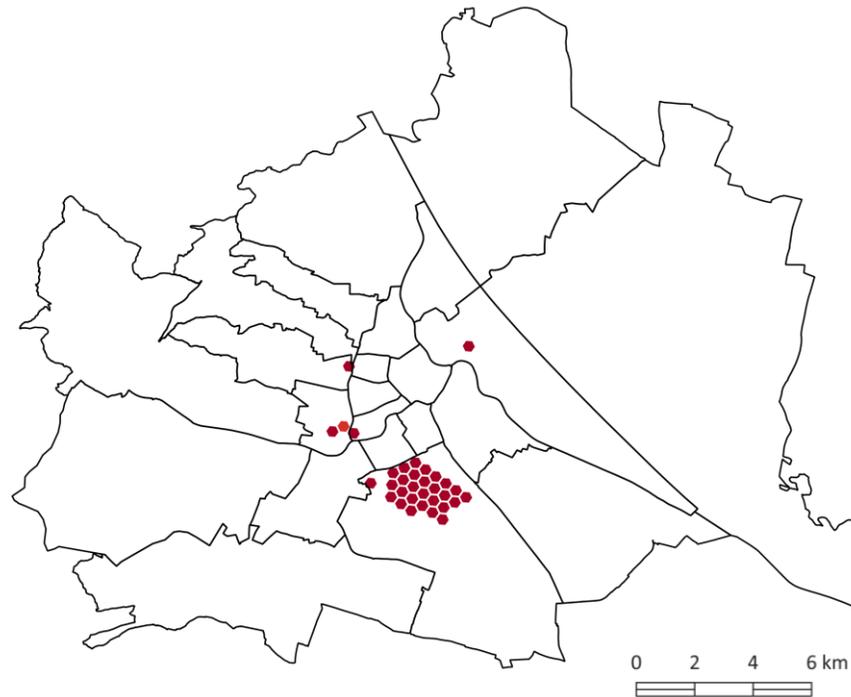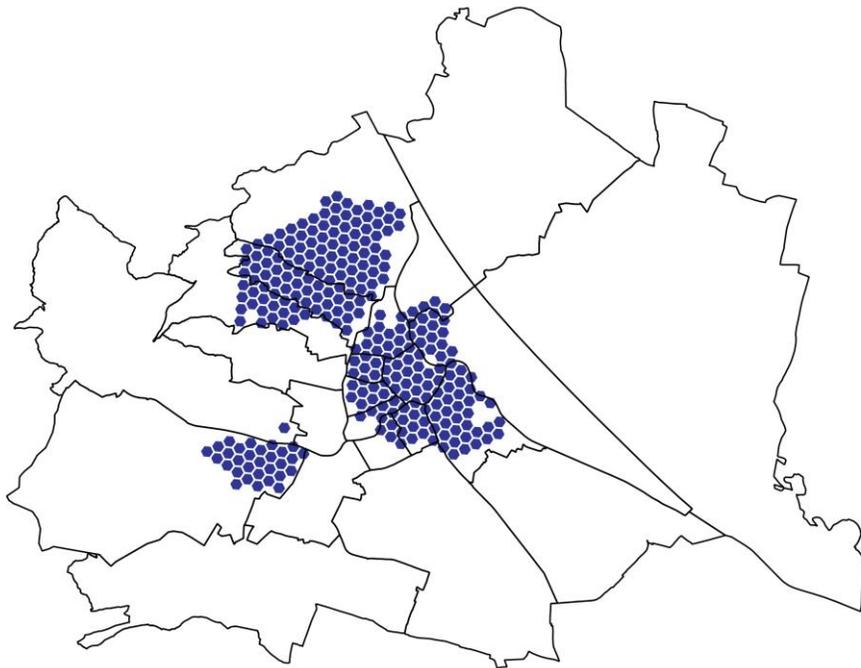# Collective perceptions of safety and general safety perception

Participants had the option to indicate whether the area is generally perceived by others as secure or unsafe.

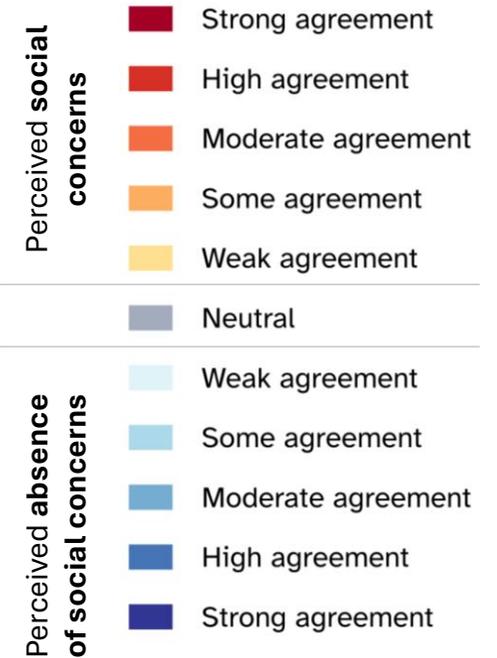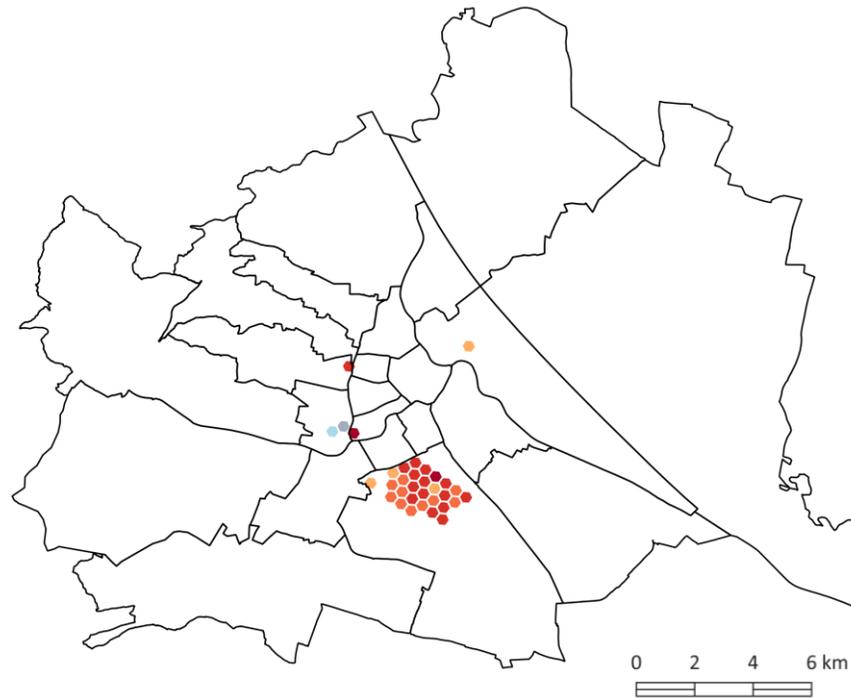Collective perceptions of safety and social concerns

Participants were also given the option to identify social concerns in the area, including the presence of gangs, drug-related activity, or individuals experiencing homelessness.

Mapping and modeling the crime perception gap