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Evaluating Perceptions of Security Measures in Public Transport for Women in Brussels

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Supervisor: Prof. Dr. Rianne van Melik



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Abstract

This master thesis evaluates women's perceptions of security measures in public transport in Brussels, integrating qualitative insights from travel diaries and 10 subsequent semi-structured interviews. It uncovers the significance of infrastructure, technology, and human interaction in shaping women's feelings of safety and confidence in public transit environments. Central to this investigation is the research question: "How do women perceive the effectiveness of security measures in Brussels' public transport?". This question guided the study's exploration into the intricate dynamics of public transport security in the capital city of Belgium. It underscores the indispensable role of infrastructure, human interaction and technology by highlighting the critical need for clear, comprehensive communication about security measures. It also advocates for the employment of social media as a tool to bridge the information gap. Despite focusing on public transport users—who may inherently feel a certain degree of security—the research highlights ongoing safety concerns, emphasizing the necessity of a diverse approach to enhance women's safety in public transport. Recommendations include enhancing visibility and accessibility through infrastructural improvements, intensifying staff presence and training for better human interaction, and leveraging technology for security updates diffusion and passenger support. These strategies aim to cultivate a more secure and inclusive environment for women passengers, offering significant contributions to the discourse on urban mobility, gendered safety perceptions, and the pivotal role of technology in public transport security enhancement. This research contributes to the academic and practical understanding of urban mobility, gendered perceptions of safety, and the role of technology in enhancing public transport security.

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List of abbreviations and acronyms

- STIB/MIVB: Société des Transports Intercommunaux de Bruxelles/Maatschappij voor Intercommunaal Vervoer te Brussel
- SNCB/NMBS: Société Nationale des Chemins de Fer Belges/Nationale Maatschappij der Belgische Spoorwegen
- CPTED: Crime Prevention Through Environmental Design

1. Introduction

1.1. Introducing the topic

This research aims to delve into the landscape of security measures within the (semi-)public transport network of Brussels and evaluating their effectiveness from the perspective of women. The essential role of public transportation in urban development and sustainability is widely recognized globally. Public transportation is a crucial component in managing urban growth (Abdallah, 2023), reducing greenhouse gas emissions (Chester & Horvath, 2009; Chester et al., 2013), and enhancing mobility and promoting social inclusivity (Bocarejo & Oviedo, 2012). However, its utilization, particularly among women, is often undermined by security concerns (Kacharo et al., 2022). These apprehensions are not unfounded, as incidents of harassment such as sexual comments, groping or stalking, as well as other security issues in public transport are reported frequently, triggering the need for enhanced safety measures (Dhillon & Bakaya, 2013; Horii & Burgess, 2012; Kacharo et al., 2022; Kearl, 2010; Loukaitou-Sideris, 2009; 2016).

In Brussels, a city distinguished by its cultural richness and significant political importance, ensuring the safety of women using public transport could contribute to promoting inclusivity, equality, and urban development. Brussels public transport network STIB (or MIVB in Dutch) users reported “security” along with the rise of drug-use and aging vehicles as their main concerns (BX1, 2023). The recent incident involving a terrorist shooting near the metro station of Yser, underscores the pressing nature of the matter (Norman, 2023).

The scope of the analysis will encompass a broad spectrum of security measures, both technological and non-technological, designed to boost security of passengers. Examples of non-technological and infrastructural measures comprise well-lit stations, visible security personnel and public awareness campaigns that create an environment of safety and awareness (Smith, 2008). Technological strategies include the implementation of CCTV surveillance, emergency alarms, real-time tracking, or monitoring systems that are aimed at deterring potential offenders and facilitating rapid response to security incidents (Beecroft, 2019).

Studies such as those conducted by Loukaitou-Sideris (2016) underscore the global prevalence of security concerns among female passengers but are limited in geographical scope and the diversity of security measures evaluated. Furthermore, advancements in technology have introduced a new array of tools and strategies that are yet to be examined in academic literature (Beecroft, 2019).

Technology has emerged as a transformative tool in bolstering the security of public transportation systems, particularly for women. Artificial Intelligence (AI) technologies, including machine learning and computer vision, are instrumental in enhancing the efficiency and responsiveness of existing security measures (Beecroft, 2019; Mastrobuoni, 2020). For instance, AI-powered surveillance systems can analyze video footage in real-time, identifying potential threats and unusual activities and instantly alerting security personnel (Zhang et al., 2017). These AI applications not only augment the effectiveness of security protocols but also ensure optimal allocation of security resources for enhanced safety of women travelers (UITP, 2020).

Nonetheless, Beecroft (2019) also argues that the human component in security is irreplaceable and that “crime waves can follow the introduction of transport technologies prior to reactive measures being taken”.

"Semi-public transport" is not a term with a universally standardized definition. Unlike public transport, which is typically operated by government or public entities, semi-public transport might be operated by private companies but serves a broader public purpose.

In this context, this research aims to offer an in-depth analysis of the prevailing security measures in Brussels, capturing the personal experiences and perceptions of women. By using qualitative methodologies, this study will provide a view of the multimodal public transport in Brussels, exposing the challenges and weaknesses associated with each security measure. The findings are expected to not only contribute to academic literature but also offer actionable insights for policy formulation and implementation within public transport and semi-public transport companies, driving a more gender-sensitive, effective, and inclusive public transport security model. Given the multi-modal and international scope of Keolis, the company I am currently employed with, my research will encompass various modes of transportation including trains, trams, buses and charter-coaches. This diverse focus aligns with the company's operational range across different transportation mediums, and will facilitate a thorough understanding of the security measures in place for women across these various transit environments. Furthermore, It is imperative to encompass various modes of public transport, as they present distinct dynamics and challenges concerning women's safety. The diversity in these transport modes, characterized by varying trip lengths, number of stops, and the presence or absence of on-board personnel, could impact the experiences and perceptions of safety among female passengers.

1.2. Research objective

As the importance of public transportation and the pressing concerns surrounding women's security has been established, it is essential to articulate the core aims of this research. Understanding the intricacies of public transportation security and its implications for women in Brussels is not just about recognizing the challenges. It is about charting a clear path forward. A well-defined purpose is therefore essential.. The primary objective of this research is to examine women's perception of security measures in public transport, and delve into the potential of modern technologies in enhancing the security and safety of women passengers. This examination seeks to uncover the subjective experiences and concerns of women, understanding the efficacy, accessibility, and responsiveness of existing security measures from a gendered perspective. Moreover, the research endeavors to explore the realm of technologies such as real-time surveillance by AI, or emergency response mechanisms such as mobile apps, scrutinizing their capability to bolster security measures and provide a safe and reassuring environment for women passengers.

By aligning security measures with women's needs and leveraging modern technologies, this research strives to foster a more inclusive, safe, and sustainable urban transportation ecosystem. Ultimately, it aspires to influence policies and practical interventions that enhance women's security in public transport, promoting equitable and accessible urban mobility for all.

1.3. Research Question

Having established the pressing concerns surrounding women's security in public transportation and the significance of understanding their perceptions, it is vital to articulate the specific inquiries that will guide this research. In the following section, I will delineate the primary research question that serve as the foundation for the exploration into the landscape of (semi-)public transport security measures in Brussels, particularly from the perspective of women.

“How do women perceive security measures in (semi-)public transport in Brussels?”

Understanding how women perceive security measures in Brussels' public transport is pivotal. This central question not only anchors the study but also holds the potential to uncover precious insights into women's experiences, concerns, and expectations. Focusing on women reflects the recognition that they often face unique safety challenges in public transportation settings, including higher risks of harassment and assault (Miti et al., 2023; Smith, 2008; Valentine, 1990) Women's perceptions and experiences are crucial for developing targeted interventions that address these challenges effectively. Literature such as Loukaitou-Sideris (2016) and Neupane & Chesney-Lind (2014) provide foundational understanding and methodologies for exploring the perception and effectiveness of security measures. Their perceptions can influence policy-making, infrastructure development, and technological innovations, ensuring that public transport systems cater to the safety and well-being of all passengers. This central question has guided the exploration, analysis, and recommendations toward creating a safer, more inclusive transportation environment for women in Brussels and beyond.

Choosing Brussels as the study's focus was intriguing due to its unique position as a diverse, international city and the heart of the European Union, presenting distinct urban mobility challenges and opportunities (Costa & De Valk; 2021; De Backer, 2022). Brussels' complex socio-political landscape, combined with its dense public transport network, offers a rich context for examining women's safety perceptions (Devroe & Ponsaers, 2021). The city's efforts to enhance public transportation safety and accessibility amidst growing concerns about security and harassment provide valuable insights into the effectiveness of such measures in an urban environment characterized by its multicultural population and significant daily commuter influx (STIB, 2023).

The diary entries combined with semi-structured interviews provided a platform for in-depth discussions, enabling a detailed exploration of individual experiences and perceptions regarding the impact of these technologies on women's safety in public transport. This methodological framework allows for a rich understanding of the experiences of women passengers, thereby contributing valuable perspectives to the discourse on improving safety and security in public transport systems.

1.4. Relevance and importance of the research

There needs to be a scientific and a societal relevance to the topic of interest in order to conduct meaningful research. The scientific relevance and societal relevance will both be outlined in the following sub-chapter. With the previously-mentioned research question set to explore the depth of women's perception of security measures, it is crucial to understand why such an inquiry holds both scientific and societal significance.

1.4.1. Scientific relevance

The existing body of literature highlights the importance of security in public (Loukaitou-Sideris, 2016; Neupane, 2017; Smith, 2008; Valentine, 1990). This study enriches the field by offering a detailed exploration of women's perceptions of security measures within public transit systems, a topic that has not been thoroughly examined in prior urban and transportation research. Through its focused investigation, this research provides valuable insights, contributing significantly to our understanding of how security is perceived and experienced by women in the context of public transportation.

The evaluation of both technological and non-technological security measures offers an interdisciplinary inquiry, bridging urban geography, gender studies and technology. A targeted examination of Brussels' public transit can provide detailed insights, unraveling patterns of perception, behavior, and experience influenced by the city's unique demographic and cultural composition.

Additionally, examining women's perception of safety measures is essential in understanding the psychological and behavioral responses that significantly influence their mobility and usage of public transport (Lynch and Atkins, 1988). Incorporating technology and artificial intelligence in the study of public safety is particularly relevant. AI holds transformative potential for enhancing public safety (Abduljabbar & al., 2019), yet empirical studies evaluating its effectiveness and efficiency in real-world environments such as public transport are limited (Beecroft, 2019; Jevinger et al., 2023). There is also a significant gap in the existing literature the impact of social media on disseminating information about public transport security measures and its influence on passengers' perceptions of safety.

While social media platforms have become prevalent channels for communication and engagement, their role in enhancing the public's awareness and understanding of security initiatives in public transport settings has not been extensively explored (Casas & Delmelle, 2017; Georgiadis, 2020). This research posits that social media could play a pivotal role in altering female passengers' perceptions of safety, potentially offering an effective medium for public transport authorities to share real-time updates, safety tips, and emergency information directly with users.

There is also a notable lack of empirical evidence on the effectiveness of staff training programs in shaping women's perceptions of safety within public transport environments. Staff presence and their ability to respond effectively to safety concerns are critical components of a secure public transport system (Maroun et al., 2024). However, the extent to which training initiatives

improve staff interactions with female passengers and contribute to a heightened sense of security remains underexplored. By examining the impact of staff training on women's safety perceptions, this study aims to fill a crucial knowledge gap, offering insights into how training programs can be optimized to enhance the overall safety and security of public transport systems for female users.

Moreover, the research can contribute to the ongoing discourse on technology's role in a sustainable society (Ceder, 2021; Miller et al., 2016; Rivera et al., 2021). By evaluating existing security measures, and by including the role of technology, the study can provide data on their perception by female passengers, potentially leading to the development of models for integrating technology in public safety in ways that are both effective and sustainable.

In a nutshell, the proposed study is scientifically relevant as it contributes to a nuanced understanding of gender-specific perceptions and experiences of security in public transport. Ensuring the safety and security of women in public transport is fundamental to promoting a more inclusive and sustainable urban transport system (UN Women, 2017). This research also aligns with the broader societal and policy-driven impetus to create safer, more inclusive urban spaces, substantiating the scientific and practical relevance of evaluating women's perception of security measures in public transport (Iqbal, 2021). The findings can potentially generate interdisciplinary collaborations, integrating insights from gender studies, urban planning, psychology, and AI, contributing to the evolution of more holistic, inclusive, and innovative model in urban safety research.

1.4.2. Societal relevance

In the context of Brussels, a city marked by its cultural, social, and political significance not only in Europe but also world-wide, addressing women's safety in public transport is essential for promoting an inclusive, diverse, and equitable urban environment. One study from 2014 shows that women are more inclined to use 'soft' modes of transportation (public transport, walking, etc.) in the Brussels-Capital Region, while men are more inclined to use the car, train, or motorcycles (Lebrun et al., 2014). Although BRUZZ (2021) reports that crime offenses have remained stable throughout the years, it also reveals there has been a substantial rise in sexual violence on public transport, with 155 cases in 2021, up from 130 in 2020 and 96 cases occurring in 2016. The Brussels public transport network MIVB (or STIB in French) announced that "complaints for lack of security have more than doubled between 2021 and 2023" (STIB, 2023). According to STIB/MIVB (2023), passengers as well as personnel have noticed a rise in feelings of insecurity aboard its vehicles. This issue seriously hampers the successful fulfillment of the STIB/MIVB's missions and the attractiveness of public transportation in general.

The topic of evaluating the security measures in public transport systems, particularly concerning women's safety in a cosmopolitan city like Brussels (Costa & De Valk, 2023; De Backer, 2022), is of significant societal relevance. Public transport is integral to the daily lives of many, offering an efficient, cost-effective, and environmentally friendly means of commuting. However, safety

concerns, especially for women and other vulnerable groups, can drastically reduce the usability and accessibility of these vital services, potentially exacerbating gender inequalities and restricting women's mobility (International Labour Office, 2017; Loukaitou-Sideris, 2014; Neupane, 2017). The International Labor Organization study (2017, p.26) points out that "limited access to and safety of transport reduces the probability of women's labor force participation by 16.5% in developing countries". Safety in public transportation is not merely a matter of individual well-being but is intrinsically linked to broader societal issues such as gender equality, urban development and economic productivity (Duflo, 2012). Women's restricted mobility due to safety concerns not only limits their access to educational, economic, and social opportunities but also has broader implications for societal progress and development (Peters, 2013). Furthermore, increased usage can lead to economic benefits such as higher revenues for public transport agencies, reduced traffic congestion, and decreased environmental pollution due to reduced dependence on personal vehicles (Omonov, 2022; UN-Habitat, n.d.; Weisbrod & Reno, 2009). In cities where public transport is seen as unsafe for women, they might resort to less efficient, more expensive, or less sustainable modes of transportation, which can limit their participation in various sectors of the economy and result in lost economic potential (Law, 1999; Peters, 2013).

AI technologies, such as machine learning and computer vision, can process and analyze data at unprecedented scales and speeds, offering real-time insights and predictive analytics to preemptively address safety concerns (Beercroft, 2019; Mastrobuoni, 2020). For instance, AI-powered surveillance systems can detect and respond to unusual or potentially dangerous behaviors in real-time, thereby enhancing the responsiveness and effectiveness of security interventions (Singh, 2020).

In Brussels, Keolis operates within the transportation sector focusing on sectors such as event shuttles, tourism coaches or school transportation. Outside of Brussels, the company functions as a private entity, leasing its buses for use under public transport brands, such as TEC in Wallonia and De Lijn in Flanders. Keolis's role in the transportation landscape is not just about moving passengers from point A to point B; it is about doing so while ensuring the safety, comfort, and well-being of every passenger (Keolis, n.d.). With its global reach and commitment to excellence, Keolis can serve as a case study of how transportation companies should prioritize the safety of female passengers. Their practices, challenges, and successes can provide valuable insights into the broader societal issue of gender safety in public transport, illuminating pathways for other companies and policymakers to follow. In addition, this evaluation would provide insights and recommendations that could be pivotal in informing policy, planning, and operational improvements, ensuring that the city's public transport system is accessible and safe for all users, regardless of their gender.

This research also aligns with the sustainable development goals (United Nations, n.d.), particularly in fostering innovation and infrastructure development (Sachs & Schmidt-Traub, 2016), and ensuring the safety and well-being of all citizens in public spaces (Duflo, 2012). By embarking on a thorough evaluation of the perception of the effectiveness of security measures for women in public transport in Brussels, this study contributes to the larger discourse on urban

safety, gender equality, and sustainable urban living. Its findings could inspire not only the implementation of technological innovations but also policy reforms, public awareness, and systemic changes essential for fostering a safe, inclusive, and equitable transportation environment.

1.5. Methods

In order to conduct this research, the data was collected by using an interpretative phenomenological approach, aligning with the methodologies commonly used in qualitative research to delve into human experiences and perceptions. Interpretative Phenomenological Analysis (IPA) is particularly suited for studies aiming to understand how individuals perceive and make sense of their social world (Smith et al., 2009).

Travel diaries served as a primary tool for capturing real-time insights and reflections from women passengers in public transport. This method offers an unfiltered glimpse into the immediate reactions and thoughts of participants, particularly regarding their feelings of security (Reid et al., 2005). The spontaneity and personal nature of diary entries provide rich data, encapsulating the personal experiences of the participants in their daily commutes.

On the other hand, semi-structured interviews were used to explore these experiences further. This format allows for flexibility and depth, enabling participants to express their perceptions and experiences more fully (Smith & Osborn, 2008). The interviews aim to uncover deeper insights into how women perceive the effectiveness and impact of security measures in public transport. The combination of travel diaries and interviews offers an exhaustive understanding, balancing immediate reflections with more reflective and elaborated narratives.

This methodological triangulation ensures a multilayered understanding of the research topic. By integrating data from multiple sources, the study aims to provide a well-rounded analysis of women's experiences and perceptions of security in public transport, with particular emphasis on the impact of modern security technologies. A detailed description of the used methodology can be found in chapter 3.

1.6. Reader's guide

This thesis begins with a theoretical framework in Chapter 2, which discusses the scientific works that form the foundation of this research. This chapter will elaborate on various elements, including public transport systems and their security measures, the types of social orders governing these spaces, and how experiences and perceptions influence women's travels when using public transport systems. Chapter 3 is dedicated to the research methodology, including a critical review that details the potential limitations of the chosen methods. In Chapter 4, the results are presented, discussing women's participation in and perceptions of security within the public transport sphere. The fifth and final chapter provides the conclusion and discussion. It

includes answers to the research question, recommendations for practical application, future research, and a reflection on the research process.

2. Theoretical framework – Navigating Women’s Security Perceptions in Public Transport

2.1. Introduction

The discourse on security in public transport has gained traction over the years (Abdallah, 2023; Maroun et al., 2024; Miti et al., 2023), reflecting the growing concerns surrounding passenger safety and well-being. Particularly, the gendered dimensions of security, focusing on women's perception and experience, are drawing scholarly attention due to the various challenges women face in public transport systems. This literature review explores sociological concepts such as civil inattention and public-private dichotomy to understand how individuals, particularly women, navigate and perceive safety in shared public spaces. It also highlights the need for gender-sensitive approaches in the planning and implementation of public transport systems, ensuring that they cater to the diverse needs and experiences of women passengers.

2.2. Public transport systems: a conduit for societal equity and interaction

Public transport systems have a long and evolving history, reflecting their critical role in societal development and urbanization. The emergence of public transport can be traced back to the early 19th century with the advent of horse-drawn buses and trams, evolving into the electric streetcars and underground rail systems that reshaped urban mobility (Schivelbusch, 1986). As cities expanded, public transport became an essential element of urban infrastructure, facilitating the daily commute of millions and contributing to the economic and social vibrancy of cities (Abdallah, 2023). Beyond mere functionality, public transport systems mirror societal values and urban cultures, influencing patterns of social interaction and accessibility (Tuvikene et al., 2023). They serve not just as physical connectors but as social spaces, where diverse communities intersect and interact (Cresswell, 2010).

Public transport systems not only facilitate urban mobility but also address various societal issues, reflecting the complexities of urban living and social dynamics (Ocejo and Tonnelat, 2014). Historically, the development of public transport has been intertwined with the growth of cities, playing a critical role in shaping urban life and social structures (Schivelbusch, 1986). One of the pivotal societal issues public transport addresses is social equity (Bastiaanssen et al., 2022). Accessibility to affordable and efficient public transport is crucial for the inclusion of marginalized communities and for reducing social inequalities (Martens, 2017). It enables access to employment, education, and healthcare, which are essential for social mobility and equality (Abdallah, 2023).

Moreover, public transport systems are arenas where diverse social groups interact, serving as microcosms of broader societal interactions and reflecting cultural norms and values (Cresswell, 2010). This interaction in shared spaces can both challenge and reinforce social boundaries, offering insights into societal attitudes towards issues like gender, race, and class (Ocejo and

Tonnelat, 2014). Environmental sustainability is another key issue addressed by public transport. With growing concerns about climate change and urban air quality, public transport offers a more sustainable alternative to private car use, contributing to reduced carbon emissions and a smaller ecological footprint (Banister, 2005; Glaeser, 2011; Omonov, 2022).

Furthermore, public transport systems have become critical in emergency and disaster management within urban settings. Efficient public transport can aid in evacuation and emergency responses, reflecting the need for resilience in urban planning (Bullard & Wright, 2009). The importance of public transport in society extends beyond mere transportation; it embodies the challenges and opportunities of urban living, offering a lens through which various societal issues can be examined and addressed (Bastiaanssen et al., 2022).

Enright (2016) insightfully argues that common perceptions might perpetuate a 'myth' surrounding public transport as a beneficial public service. According to Enright, this myth glosses over the reality: the main stakeholders in public transport—from service providers to regulatory bodies and political institutions—often perceive passengers through a generic lens, representing them as a homogeneous group ('coded white, male, able-bodied, and propertied') that fails to capture the complexity and diversity of urban populations (Enright, 2016, p. 141). This approach treats passengers merely as customers focused on the 'quality' and accessibility of the service, ignoring their political rights and voices. While fares are frequently seen merely as a means to ensure the operational effectiveness and financial viability of transport systems, they are actually a source of contention and evasion. The pricing strategies and enforcement of fare payment create considerable economic, structural, and social challenges (Correa et al., 2017).

2.2.1. How public transport empowers women in a male-dominated society

The integration of gender perspectives in public transport systems is a critical issue that has gained increasing attention in recent years (Abdallah, 2023; Bastiaanssen et al., 2022; Miti et al., 2023). Public transport systems, historically designed and operated without adequately considering the unique needs and experiences of women, often reflect systemic patriarchal roots. This oversight can result in environments that are not fully accommodating or safe for female passengers. Women's travel patterns tend to be more complex and multifaceted than men's, often involving trip-chaining – combining multiple destinations like work, childcare, and shopping in a single journey (Loukaitou-Sideris, 2020). However, many public transport systems are designed primarily for linear, work-commute trips, which may not align well with these patterns.

Safety is another crucial aspect where public transport systems often fall short for women. Concerns about personal security on public transport and in related infrastructure like stations and parking areas significantly impact women's mobility (Ceccato et al., 2022). The lack of gender-sensitive design and policy in public transportation can discourage women from using these services, thereby limiting their mobility and access to opportunities (Miti et al., 2023).

Efforts to address these issues involve incorporating gender-responsive planning and design in public transport, which includes understanding and catering to the specific needs of women, such as improved lighting, more frequent and well-routed services, and the presence of security personnel (Maroun et al., 2024). Recognizing and rectifying these gender disparities in public transport is not only a matter of convenience but also of social equity and empowerment.

2.2.2. Public transport measures' current stance

In the realm of public transportation, the implementation of security measures is a delicate balance between ensuring passenger safety and respecting individual privacy. Modern public transport systems are increasingly adopting advanced technologies such as surveillance cameras and facial recognition software to enhance security (UITP, 2020). However, these measures often raise concerns about privacy and the potential for over-surveillance (Polonetsky, 2013). Effective security strategies should not only focus on technological solutions but also consider the social and behavioral aspects of security, like passenger awareness and staff training (Beecroft, 2019). This integrated approach recognizes that while technology plays a crucial role in deterring and responding to threats, the human element remains integral in creating a secure yet comfortable environment for travelers.

Current security measures in public transport often focus on surveillance, policing, and architectural design, each playing a crucial role in enhancing passenger safety. However, the effectiveness of these measures can vary based on implementation and context.

Surveillance, including CCTV cameras, is widespread in public spaces as well as in public transportation systems (Brands et al. 2013). While it aids in monitoring activities and can act as a deterrent to crime, its effectiveness is often debated (Abdallah, 2023). According to Jung & Wheeler (2023), surveillance systems can be effective in reducing crime in public transport settings, particularly when combined with other security measures such as improved lighting and emergency call boxes. Abdallah (2023) cautions that the mere presence of surveillance cameras does not guarantee a reduction in crime, emphasizing the need for strategic placement and active monitoring. Policing and the presence of security personnel contribute significantly to passenger safety (Maroun et al., 2024). This element has been widely replaced by monitoring systems, which, according to Abdallah (2023), can greatly reduce the feeling of safety in stations and stops. Ceccato (2013) and Maroun et al. (2024) argue that the visibility of police and security staff can deter potential offenders and provide a sense of safety to passengers. Nonetheless, this approach requires a balance to avoid over-policing, which can lead to discomfort among passengers, as noted by Smith and Clarke (2000).

Heebels and van Aalst (2020) argue that CCTV surveillance is a cultural practice where operators play a crucial role in the interpretation of images, influenced by informal practices, group dynamics, and the cultural context of their work environment. Operators collectively make sense of the images they monitor, engaging in discussions, utilizing humor, and relying on their shared skills and experiences to interpret and respond to what they observe. Furthermore, they negotiate the meaning of images, which in turn influences their judgments and actions.

An article by Useche et al., (2018) investigates the relationship between working conditions, job strain, and traffic safety among three groups of public transport drivers: taxi drivers, city bus drivers, and interurban bus drivers. The explores how job strain—a combination of high psychological demands and low decision latitude—impacts the operational performance and safety of public transport drivers. Their findings revealed that job strain significantly contributed to the occurrence of suffered accidents, highlighting the influence of psychosocial work factors on driver safety. Furthermore, the research found notable differences in the exposure to psychosocial risks at work among the three groups of drivers, suggesting the need for specific occupational safety interventions tailored to each group.

In conclusion, the study underscores the importance of addressing work stress and job strain to enhance the safety and performance of professional drivers in the public transportation sector. It suggests that improving the working conditions of drivers by managing job strain could lead to better traffic safety outcomes.

Architectural design is another critical aspect. According to Ceccato et al. (2022), Crime Prevention Through Environmental Design (CPTED) principles can be effectively applied in transit environments to reduce opportunities for crime. These principles include natural surveillance, territorial reinforcement, and access control, which, when integrated into the design of public transport facilities, can significantly enhance safety.

2.2.3. The evolution of security of travel

Exploring the role of technology is crucial for enhancing both perceived and actual security in public transport. Surveillance systems can deter potential threats, document incidents, and bolster security perception among women passengers (Cecatto et al., 2022). Real-time tracking empowers passengers with location awareness and expected arrival times, also allowing for swift response in emergencies (Beercroft, 2019). Emergency response systems ensure rapid reaction to security concerns by linking directly to security personnel or emergency services. Implementing these technologies with a gender-sensitive approach can significantly enhance women passengers' perception of security and actual safety, creating a safer, more inclusive transport environment (Singh, 2020).

The integration of modern technologies promises a new era in enhancing security in public transport systems. Surveillance systems, real-time tracking and emergency response systems are being deployed to augment both the perception and reality of security (Ardabili, 2023; Beecroft, 2019). Beecroft (2019) also observed that technologies like CCTV cameras and panic buttons have been crucial in improving the perception of security among women passengers. Advances in artificial intelligence and machine learning are paving the way for smarter security systems capable of real-time threat detection and response (Zhang et al., 2017). The potential of technology to revolutionize security systems in public transport is immense. Emerging technologies such as facial recognition, behavior analysis, and predictive analytics offer promising methods for proactive security measures (Cats, 2023; Laufs et al., 2020).

In their research, Ushakov et al. (2022) discuss the potential of IoT technology in enhancing public transportation by enabling real-time data usage and improving service quality and efficiency. It allows customers to have precise information about their transport and operators to communicate delays. The transportation industry is utilizing IoT for various purposes including passenger information and data management, and despite current investments, the future promises more advancements with "glue technologies" facilitating larger-scale IoT deployments. For fully realizing IoT's benefits in public transportation, system integration skills and ready-made solutions are essential. These technologies can be tailored to address the specific security concerns of women, thereby promoting a safer and more inclusive public transport environment (Ardabili et al., 2023).

2.3. Technology as an urban actor in the smart city

In the discourse of urban development, the concept of smart cities positions technology not merely as a tool but as an active urban actor, reshaping the dynamics of city life. This perspective aligns with Actor-Network Theory (ANT), which posits that in a network, both human and non-human entities (actors) possess agency and the capacity to influence one another (Latour, 2005). In smart cities, technology transcends its traditional role as a passive infrastructure component, becoming an interactive agent that participates in and co-constructs urban experiences.

From an ANT viewpoint, as argued by Secinaro et al. (2021), technologies in smart cities—ranging from IoT devices to AI-driven systems—are integral actors in the urban network. They interact with human actors (citizens, policymakers, urban planners) and other non-human actors (physical infrastructure, environmental elements) to produce a dynamic urban ecosystem (Latour, 2005). This interaction is not unidirectional; rather, it is a continuous process of negotiation and adaptation, where technologies respond to and shape urban needs and behaviors.

The concept of smart cities, which integrates technology into the urban fabric, offers significant potential for enhancing public transport systems in a way that is more inclusive and responsive to women's needs (Cats, 2023). Smart city initiatives often include the deployment of IoT devices, advanced data analytics, and AI-driven solutions, which can transform public transport into a more user-friendly and secure system for citizens (Bubelíny & Kubina, 2021).

Building on the practical enhancements brought by smart city technologies to public transport, we see a vivid illustration of the principles of Actor-Network Theory (ANT) in action. The deployment of IoT devices, advanced data analytics, and AI-driven solutions in urban environments exemplifies how technology acts not just as a facilitator, but as a dynamic participant in the urban landscape. According to ANT, these technological interventions are not merely passive tools but active agents that interact with and influence the urban ecosystem (Latour, 2005). In this context, smart technologies like sensor-based security systems and smart lighting in transit hubs do more than improve safety and comfort; they actively reshape the experiences of passengers, altering their interactions with the urban environment (Bubelíny & Kubina, 2021). This transformation underscores the role of technology as an interactive agent

within the ANT framework, where it is not only responsive to human needs but also a co-creator of new urban realities.

2.3.1. Technology-driven solutions through innovation

The integration of technology in smart cities can be explored through the lens of Science and Technology Studies (STS), which examines how technological innovations are both socially constructed and society-shaping (Jasanoff, 2004). In smart cities, technology is embedded with societal values and norms, influencing how urban spaces are navigated, governed, and experienced (Cats, 2023). For instance, the deployment of surveillance systems in public spaces reflects societal concerns about security and privacy, while also actively shaping public behavior and perceptions of safety. STS scholars like Jasanoff (2004) argue that technology is not developed in a vacuum but is deeply influenced by the social, cultural, and political contexts in which it is created and used. This perspective is crucial in understanding the role of technology in smart cities.

This understanding extends to the domain of urban transport planning, particularly in addressing the needs of specific demographic groups such as women. Data-driven approaches in urban transport planning are critical for understanding and catering to the diverse mobility patterns (Lyon, 2021; Park et al., 2022). Big data analytics can provide insights into the travel behaviors of citizens, identifying specific needs such as the demand for safe, well-lit routes, and the importance of accessibility to social facilities (Sheller, 2018). By leveraging data, city planners and transport authorities can design more inclusive transport systems that acknowledge and accommodate the multifaceted nature of human travel patterns (Willis & Aurigi, 2017). In their study, Casas & Delmelle (2017) examine how analyzing tweets can offer insights into public opinions on Cali, Colombia's Bus Rapid Transit (BRT) system. They propose that analyzing social media, specifically Twitter, can supplement conventional methods like surveys by providing timely, cost-effective, and wide-reaching public feedback. Their methodology involves a combination of text mining and detailed content analysis to pinpoint prevalent issues discussed by users, such as concerns about safety, infrastructure shortcomings, and the behavior of fellow passengers. The results align with existing literature on public transport concerns, underscoring the effectiveness of social media as a tool for gathering public perceptions in the context of transport policy. This finding is especially relevant for developing nations, where traditional public engagement in transportation planning is typically minimal, indicating that social media could serve as a critical resource for enhancing user satisfaction and service quality in public transport systems.

Emerging technologies like AI and blockchain offer new avenues for enhancing security in public transport. AI-driven surveillance systems, for instance, can be programmed to detect and respond to security threats in real-time, providing a safer environment for passengers (Trencher, 2018). Blockchain technology can be used to create secure and transparent reporting systems for incidents, ensuring accountability and swift action (Kshetri, 2018). These technologies, when used thoughtfully, can contribute to a sense of safety and empowerment among women using public transport.

The more-than-human approach further enriches this understanding by acknowledging the agency of non-human elements in urban settings. In smart cities, technology as an urban actor interacts with other non-human elements like urban flora, architecture, and weather systems, contributing to the creation of a unique urban milieu (Whatmore, 2002). This approach encourages a holistic view of urban ecosystems, recognizing the complex interdependencies between human and non-human actors.

The integration of technology in smart cities also raises ethical and philosophical questions about the nature of urban living. As Fainstein (2010) notes, the use of technology in urban planning and governance must be guided by principles of justice, democracy, and sustainability. This requires a careful consideration of who benefits from smart city technologies and who might be disadvantaged by them.

2.4. 'Social order' as a pillar of a harmonious society

In the evolving narrative of urban development, the role of public spaces in shaping social interactions and community dynamics stands as a pivotal theme. Following the exploration of technology's integration in smart cities, this chapter shifts focus to the intertwined tapestry of urban public spaces, as conceptualized by classic and contemporary urban theorists.

Classic urban theorists have often characterized the public spaces of modern cities by their levels of anonymity and diversity, where urbanites encounter one another as often-strangers (Park et al., 1925; Simmel, 1969 [1903]; Weber, 1986 [1921]; Wirth, 1938). This characteristic urban interaction has been further explored by contemporary urban scholars who delve into the behavior of individuals in public spaces and the significant role these spaces play in the citizens' lives. For instance, studies have underscored a prevalent sense of fear and cautious behavior on city streets, particularly pronounced in low-income and minority areas (Anderson, 1990, 1999, 2008; Cahill, 2000; Merry, 1981). Anderson (1990), in particular, utilized the concept of 'street wisdom' to elucidate the strategies individuals employ to ensure personal safety by categorizing others based on social types and/or perceived threat levels, thereby navigating public spaces as confident actors amidst potentially dangerous and volatile streets.

On a contrasting note, some scholars have highlighted the beneficial aspects of urban public interactions. For instance, Jacobs (1961) and Oldenburg (1998) emphasized the integral function of public spaces in assimilating strangers into the social fabric of the urban milieu, thereby making such spaces invaluable assets for urban life.

2.4.1. Navigating social norms in public transport

Public transport exemplifies a unique public space entailing a myriad of interactions among various strangers who are bound to coexist for extended periods (Tuvikene et al., 2023). Unlike localized commercial or residential areas, it encapsulates a more transient, yet enclosed space where riders, despite potential recognizability, cannot predict who they will encounter

(Wenglenski, 2023). This necessitates a negotiated social order within the encapsulated spaces in question, often crowded, with no immediate escape options.

Literature delineates general forms of social control in such settings, such as the presence of drivers and security cameras. Yet, in subways for instance, the collective of riders often lack immediate supervision and must autonomously negotiate social norms (Chowdhury and McFarlane, 2022). Goffman's (1963) notion of an 'open social order' is manifested in the subway environment, where riders, despite being strangers, adhere to a set of contextualized social norms fostering civil inattention to avoid startling, offending, or intruding upon others' personal space. Goffman argues that perpetually changing ridership and crowded conditions render the subway's social order in a continual state of crisis, at risk of norm violations, thus presenting a distinctive milieu for practicing urban interactions. Teenagers represent a peculiar type of stranger within this space, often perceived ambiguously by adults and known for forming 'micro-communities' defying adult scrutiny (Symes, 2007). Their interactions within the subway, alongside the general populace, contribute to the complex tapestry of social norms, order negotiation, and the lived experiences of urban public spaces (Ocejo and Tonnelat, 2014; Tuvikene et al., 2023).

The prevailing view in scholarly research considers fare evasion as a significant issue, primarily framing it as an operational and financial challenge that leads to ticket revenue losses for transport companies (Cantillo et al., 2022). This issue gained prominence within formal transportation networks across Europe during the 1960s with the elimination of on-board fare collectors in buses and tramways, which gave rise to 'honour ticketing systems.' In these systems, passengers are expected to buy and validate their tickets independently (Bijleveld, 2007; Nahuis, 2005). As a response, transport operators in the global North transitioned towards a 'proof-of-payment' approach, incorporating ticket validation infrastructure like turnstiles and gates and reintroducing 'pay-on-entry' methods. These methods compel passengers either to buy their tickets directly from the driver upon entering the vehicle or to show a ticket they have previously purchased (Schwerdtfeger, 2018).

2.4.2. 'Cosmopolitan canopies' and multi-cultural negotiations

The concept of the "cosmopolitan canopy," introduced by sociologist Elijah Anderson in his 2004 work, represents a metaphor for urban spaces where social diversity and harmony coexist. These canopies are public areas in cities where individuals from varied social, racial, and economic backgrounds interact with a sense of shared community and mutual respect. Anderson's exploration of cosmopolitan canopies reveals spaces where societal norms are temporarily relaxed, fostering an environment of tolerance and open-mindedness. The concept is instrumental in understanding how public spaces can serve as crucibles for social integration, challenging preconceived biases and promoting a more inclusive and harmonious society. In these settings, individuals feel a sense of safety and belonging, enabling them to lower their guard and engage more freely with others, regardless of their background. The cosmopolitan

canopy thus becomes a microcosm of potential urban harmony, showcasing how diverse groups can coexist peacefully in shared spaces.

Cosmopolitan canopy can, however, fail to explain people's gloss or "superficiality". People can act politely and civil, whose actions can simply be seen as a disingenuous act. This behaviour can be seen as a performance or as the "front stage" as argued by Goffman (1959). Though verbal exchanges may be limited, communication still transpires through visual cues and the arrangement of individuals in the space (Bissell, 2010, p.271). These subtle social movements are not a mere coincidence; they emerge from complex negotiations (Chowdhury & McFarlane, 2022). As claimed by Augé (2002, p.30), a ride on the metro involves 'collectivity without festival and solitude without isolation'.

Anderson (2004) also discusses societal dynamics and perceptions in public spaces, noting how ingrained stereotypes and prejudices can impact interactions. He observes that, in certain contexts, the presence of individuals perceived as 'anonymous young black males' can challenge the prevailing 'code of civility' due to societal biases and stigma (p. 27). In an era where the dynamics of international migration intersect with daily urban commuting patterns, common spaces like buses or trains used for work commutes can transform into convergence points for global diversity (Koefoed et al., 2017). This renders public transportation an intriguing mediator where individuals encounter ethnic diversity and perceived "others". The journeys on public transport create environments where unfamiliar strangers engage in interactions within much closer confines than those typically encountered elsewhere (Bovo et al., 2023).

2.4.3. Civil inattention or non-social behaviour?

Building upon Anderson's insights into the complex interplay of societal dynamics within public transportation, we now turn to a more micro-level examination of individual behavior in these shared spaces. Here, the concept of civil inattention, as introduced by Erving Goffman, provides a subtle yet profound understanding of how personal interactions are navigated amidst the diversity and proximity inherent in public transit. The phenomenon of civil inattention, as conceptualized by sociologist Erving Goffman (1963), is a foundational element in understanding the social dynamics within public transport. This concept, referring to the subtle yet strategic non-engagement with others in shared public spaces, maintains both social order and personal privacy. In the context of public transport, this takes on added dimensions, as explored by Lofland (1998), who discusses the nature of social interactions in urban public realms. The interplay of civil inattention in public transport is a manifestation of the complex social choreography that occurs in these spaces. It refers to the phenomenon where strangers, even when in close proximity, courteously behave as though they are unaware of each other's presence (Lofland, 1998). Civil inattention occurs out of respect for each other people's privacy. In certain settings, like public swimming pools, individuals often behave as 'disinterested strangers,' respecting others' personal space (Scott, 2009). Scott (2009, p. 126) also remarks that this leads to surprisingly 'orderly and civilized' interactions among people.

Passengers, while in close proximity to each other, engage in minimal interaction, maintaining a delicate balance between communal presence and individual solitude. The design and architecture of public transport facilities significantly influence how civil inattention is enacted. The importance of spatial arrangements in facilitating or hindering social interactions in public spaces should also be emphasized (Gehl, 2007). The layout of seating, positioning of doors and windows, and overall spatial design of buses, trains, and metro stations can subtly dictate the flow of civil inattention among passengers. In the dense and often overwhelming context of urban environments, civil inattention serves as a coping mechanism for individuals to manage sensory and social overload. This aspect is also highlighted by Milgram (1970) in his analysis of the psychological experiences of living in cities. The transient nature of public transport, where individuals from diverse backgrounds and with different purposes come together, accentuates the need for such unspoken social norms, as discussed in Urry's (2007) work on mobilities and social interactions.

The implications of civil inattention extend beyond mere social etiquette. As Merry (1981) argues, these unspoken norms have profound impacts on how individuals perceive and experience public spaces.

Contrastingly, nonsocial transient behavior involves a more deliberate avoidance of recognition and interaction, not out of respect, but from a desire to be unnoticed (Kim, 2012). Unlike civil inattention's respectful space acknowledgment, nonsocial behavior more explicitly signals a desire to be left alone, a type of performance indicating a wish not to be disturbed. Kim (2012) argues that this conduct is often observed in areas considered to be risky, leading individuals to be more vigilant and watchful. Such areas often include neighborhoods with a high incidence of crime and locations crowded with people, such as music events, dance clubs, and other venues where people, largely unfamiliar with each other, remain in close proximity for long durations with minimal privacy. However, it's important to acknowledge that not all individuals consistently display nonsocial behavior. The nature and patterns of this transient nonsocial conduct tend to vary and evolve over time (Park et al., 2022).

2.5. How traveling is experienced and perceived

Travel during the 19th century, particularly in the context of railway journeys, has often been perceived as an experience of isolation. Thrift (1996) vividly describes this perception by comparing travelers to "anonymised parcel of flesh" passively transported alongside other goods, while consciously avoiding interaction with fellow passengers (Thrift, 1996, p. 266). However, the reality of mobility, especially in modern times, contradicts this notion of solitary travel. Most travel experiences, in fact, involve a form of collective experience or 'being with' others (Bissell, 2010, p.270). As passengers, individuals are part of a transient yet interconnected community, sharing a common journey. This concept of 'being with' transforms the travel experience from an individual to a collective phenomenon, where the act of moving from one place to another transcends personal isolation and becomes a shared human experience (Bovo et al., 2023).

Perception is a critical cognitive function that allows individuals to interpret and understand their environment by processing sensory data. This process is not just about recognizing sensory stimuli but also involves integrating these perceptions with memories and immediate sensory inputs (Goldstein, 2014). The way people perceive their environment is heavily influenced by their past experiences, mood, and the context in which they receive sensory information, as highlighted by Eysenck and Keane (2015). Perception serves as the foundation for various cognitive processes, playing a vital role in how individuals interact and engage with their surroundings. Its importance spans across several disciplines, including psychology, neuroscience, and philosophy, as it is essential for understanding human interaction with the world (Sekuler & Blake, 2002).

2.5.1. Collective emotions and the 'affective turn'

The affective turn represents a significant shift in social sciences and humanities, focusing on emotions and affects as central to understanding human experiences and social interactions. This concept emerged from the recognition that emotions are not just private, internal experiences but are deeply embedded in the social and cultural fabric (Clough and Halley, 2007). Emotions and affects are integral to how individuals perceive and engage with their environment, influencing their behavior, decisions, and interactions. Anderson (2009) further explores this idea, emphasizing that emotions create 'affective atmospheres' which can pervade spaces like public transport, shaping how these spaces are experienced and perceived.

In the context of public transport, the affective turn provides a framework for understanding how passengers, particularly women, experience and perceive security and safety. Bissell (2010) notes that the collective mood and emotional tone within a public transport setting can significantly influence passengers' feelings of comfort or anxiety. These affective atmospheres are not just the result of individual emotions but are also shaped by the physical environment, social

interactions, and cultural norms. They can either contribute to a sense of safety and well-being or exacerbate feelings of vulnerability and risk.

Furthermore, the affective turn highlights the role of shared emotional narratives in shaping collective perceptions of security (Gregg & Seigworth, 2010). In public transport, the stories and experiences shared among women can contribute to a collective understanding of what spaces are safe or unsafe, influencing their travel choices and behaviors. As noted by Ahmed, "emotions work by sticking figures together ... a sticking that creates the very effect of a collective" (2004a, p. 119). This collective emotional landscape is crucial for transport authorities to consider when designing safety measures and policies.

2.5.2. How do women perceive security in public transport?

Several studies have assessed women's perception of security measures in public transport systems. Women's safety in public transport is a complex issue influenced by a plethora of factors such as the design of transit facilities, the security measures that were put in place, and the presence or absence of security personnel (Cecatto & Paz, 2017; Gekoski et al., 2017; Loukaitou-Sideris, 2009, 2016; Valentine, 1990). Loukaitou-Sideris (2016) explored women's experiences and perceptions in urban public transport, finding that many women experience fear, even if crime rates are low. Another study by Kacharo et al. (2022) highlighted that women's perception of safety in public transport systems is influenced by several factors including the presence of security personnel, adequate lighting, and surveillance systems. Kacharo et al. (2022) further argue that female passengers often experience unique security concerns such as fear of harassment, assault, or theft, which can significantly impact their mobility and access to opportunities (Kearl, 2010). In a 'hyper-masculinized-space' such as in Mexico-City, women who use public transport must navigate a place "where large numbers of men behave in ways which are oppressive to women" (Dunckel-Graglia, 2013, p.271).

Data from 28 world cities reveals a significant gender gap in the perception of safety on public transport (Aitbihiouali et al., 2019). For instance, only 45% of women felt secure in trains and metro stations, compared to a higher percentage (55%) feeling secure on buses (Aitbihiouali et al., 2019). Aitbihiouali's study (2019) also indicates that the gendered perception of safety extends beyond an intrinsic fear, reflecting a broader societal issue that affects women's utilization of public transport.

2.5.3. Negative impacts on unwanted sexual behaviour

The apprehension regarding the use of public transport can have a range of negative impacts on women, particularly those who have experienced unwanted sexual behavior (Kacharo et al. (2022). Such impacts include mental health issues (Horii & Burgess, 2012), agoraphobia (Fahmy et al., 2014), disrupted sleep and nightmares (Battered Women's Support Services, 2014). Individuals who have been victims, as well as those fearing victimization, may experience feelings of anger, disgust (Jafarova et al., 2014), distress, anxiety, humiliation (Fahmy et al., 2014), objectification, and frustration (Dhillon & Bakaya, 2014). Neupane's research (2017) investigated

the pervasive issue of sexual harassment and assault faced by college-aged women on public transport in Kathmandu, Nepal, revealing a high frequency of abuse with victims seldom reporting incidents to authorities. Furthermore, despite the physical proximity and anonymity public transport provides to perpetrators, which leads to heightened levels of abuse, the victims' reluctance to file official complaints underscores the systemic challenge in addressing the violence against women in public spaces (Neupane, 2017). This coincides with Transport for London's 2013 report that 98% of unwanted sexual behaviour on public transport is not reported (Gekoski et al., 2017).

In São Paulo (Brazil), Soares (2015) illustrates how a campaign to combat sexual harassment has been successful in increasing the number of reported cases. Nevertheless, this success may be limited in improving women's actual safety, since the program relied on reporting to surrounding fellow passengers which is not always the case in stations outside of the city-center (Cecatto & Paz, 2017).

2.5.4. Pre-& post-travel decision-making and protection tactics

In the context of public transportation, the concept of the 'passenger journey' extends far beyond the physical act of transit, encompassing a series of decisions and considerations that begin even before a passenger leaves their home (Lyons et al., 2007). This journey can be influenced by a range of conscious and unconscious decisions that shape the overall travel experience. According to Lyons et al. (2007), the passenger journey is a complex interplay of choices where factors such as route, mode of transport, and time of travel are decided, often based on personal safety, convenience, and past experiences. These choices are not made in isolation; they are influenced by the individual's perceptions and experiences, including environmental factors, socio-economic status, and cultural norms (Abdallah, 2023). These elements collectively shape the decision-making process, reflecting broader societal trends and personal priorities in the context of urban mobility (Shelat et al., 2022).

The concept of 'mental mapping' (Lynch, 1960), plays a significant role here, where passengers' choices are shaped by their cognitive maps of the environment, which includes perceptions of safety and risk. Additionally, the theory of planned behavior (Ajzen, 1991) suggests that these decisions are a result of attitudes, subjective norms, and perceived behavioral control. In the context of women and public transport, these decisions often involve safety considerations, where women might avoid certain routes or modes of transport due to security concerns, as highlighted in the work of Loukaitou-Sideris (2009). This pre-travel decision-making process significantly impacts the passenger journey, influencing not only the choice of transport but also the overall experience of the journey itself.

Conversely, understanding post-travel decision-making is as crucial for transport providers and policymakers. It offers valuable insights into passenger satisfaction and areas needing improvement. This phase is crucial in informing transport authorities about the effectiveness of safety measures and the overall inclusivity of the transport system (Cats, 2023).

The conclusion of a passenger's journey in public transportation is marked not only by their physical arrival at a destination but also by a reflective process that influences future travel

decisions. This post-travel decision-making phase involves an assessment and evaluation of the travel experience, where factors such as the level of comfort, timeliness, safety, and overall satisfaction are considered (Cass et al., 2005). When a passenger experiences delays, safety concerns, or discomfort during their journey, this may lead to a reconsideration of future travel options. In the context of women passengers, particularly, post-travel reflections often include an evaluation of how safe they felt during the journey, the presence and effectiveness of security measures, and the general atmosphere of the transport environment (Loukaitou-Sideris, 2009; Koskela & Pain, 2000). The concept of 'affective appraisal' (Davidson & Milligan, 2004) is pertinent here, where emotional responses to the journey play a crucial role in shaping future travel behavior. Positive experiences can lead to a preference for similar modes of transport or routes in the future, while negative experiences might result in avoidance behaviors. Moreover, the sharing of these experiences with peers and through social media can influence the collective perception of certain transport modes or routes, contributing to broader societal understandings and norms related to public transportation (Casas & Delmelle, 2017).

Women may choose specific routes or modes of transport that they perceive as safer or more secure. This might mean opting for busier, well-lit routes, or avoiding certain types of transport at specific times of the day. The study by Loukaitou-Sideris (2016) explored women's experiences and perceptions in urban public transport and found that many women make deliberate choices about their travel to enhance their feelings of safety. According to Yavuz and Welch (2010) the timing of travel is an important consideration. Women may prefer to travel during daylight hours or when they know public transport will be more crowded, which aligns with the findings of who indicated that perceived security is higher during peak travel times. Female passengers often travel in groups or with companions as a means of deterrence against potential threats. The presence of others can provide a sense of security and act as a witness or support in case of an incident. This tactic is supported by the concepts of 'guardianship' in routine activity theory (Cohen & Felson, 1979). Many women also remain vigilant and aware of their surroundings and the people around them while using public transport. This may involve seating choice, such as sitting near the driver or in an aisle seat, to allow for a quick exit if needed, reflecting the principles of Crime Prevention Through Environmental Design (CPTED) (Ceccato et al. (2022). Carrying items that can be used for self-defense, such as pepper spray or personal alarms, is another strategy that some women adopt. However, the legality and effectiveness of these measures can vary.

With the advent of smartphones and safety apps, women have been able to use technology to inform their travel decisions, track their routes, and stay connected with friends or family members. These apps can also provide quick access to emergency services if needed, as noted by Ardabili et al. (2023).

2.5.5. Commercializing public space

Commercialization significantly influences public and semi-public transportation systems, reshaping both the physical environment and the behavior of individuals (Paulsson and Koglin, 2023). This transformation often turns these spaces into quasi-commercial zones through the

introduction of advertising, retail outlets, and sponsored amenities (Zukin, 1995). Such commercial elements can shift the dynamic from communal to transactional, as Crawford (1992) notes, leading to passengers being more engaged with commercial stimuli and less with each other. This is particularly pronounced in semi-public transport, where commercial priorities may dominate, emphasizing consumerism over community building or social interaction (Sheller & Urry, 2006).

Furthermore, the commercialization of these transport systems can impact the perception and actual security of passengers (Loukaitou-Sideris, 2007). The presence of commercial entities within transport hubs can create crowded and distracting environments, thereby potentially elevating the risk of accidents or criminal activities. This commercial influence can also lead to a stratification of services, according to Lucas (2011), where higher-priced options offer more security and comfort, creating a disparity in the perception of security based on affordability. This is particularly concerning in semi-public transport systems, operated by private companies with a public service mandate. Here, the pursuit of profit can sometimes supersede security considerations, leading to reduced staff presence and weakened direct oversight, as Currie and Delbosc (2011) have pointed out. This reduction in staff presence can significantly affect the immediate response capabilities in security matters (Abdallah, 2023).

As argued by Zukin (1995), the commercialization of public spaces, including transportation systems, not only alters the physical environment but also subtly reshapes social norms and behaviors. It creates an environment where the primary interaction is often between the individual and the commercial entity, rather than between fellow passengers. While it can introduce efficiency and innovation, the emphasis on commercial aspects requires careful balancing to ensure that security and passenger welfare are not compromised (Paulsson & Koglin, 2023). The challenge lies in managing these spaces to maintain a balance between commercial viability and the provision of safe, comfortable, and inclusive transportation services.

2.6. Conceptual model

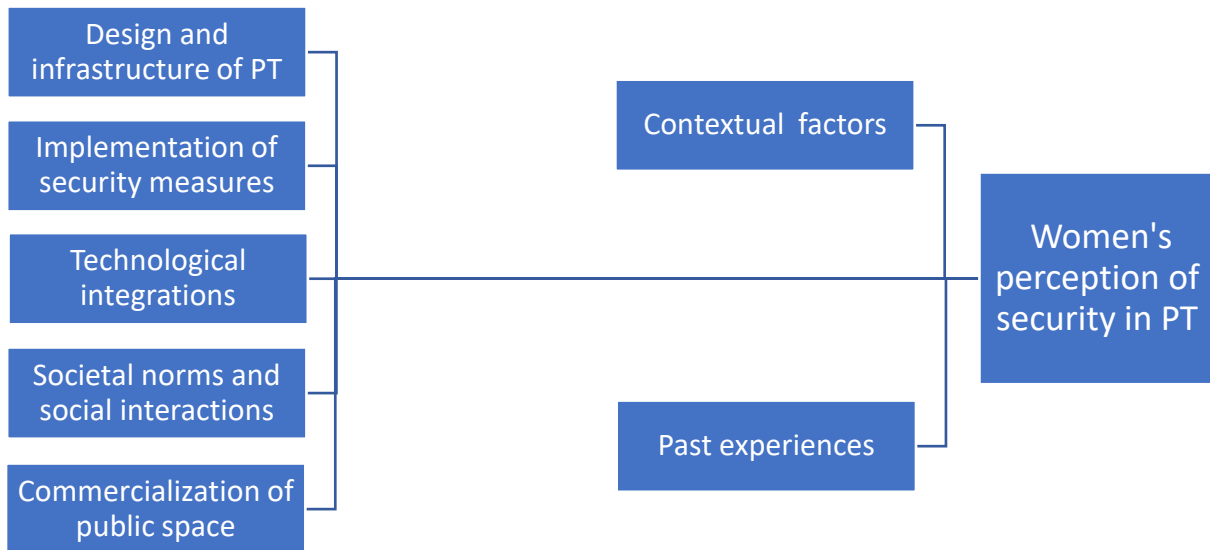


Figure 2.1. Conceptual model

This conceptual model for understanding women's perceptions of security in public transport is predicated on the interplay between several key factors; the infrastructure and design of public transport systems provide the physical context, where elements such as lighting, signage, and accessibility can significantly impact feelings of safety. The efficacy of security measures, including the presence of security staff and surveillance technologies, directly influences women's confidence in using these systems. Technological advancements also play a critical role, offering tools for real-time information and enhanced monitoring capabilities, which can contribute to a heightened sense of control and reassurance. The societal and cultural backdrop, encompassing prevailing norms and the nature of social interactions within public spaces, further shapes women's experiences and expectations of security in transit environments. Commercialization within public transport spaces can often lead to a stratified service experience where the introduction of retail and advertising elements might shift the focus from communal travel to consumer transactions, potentially influencing women's perceptions of safety and altering the social dynamics of these spaces. Contextual factors, including the overall environment such as crowdedness or temporal factors, along with past experiences, whether positive or negative, feed into the decision-making process and overall journey experience for women passengers.

At the core of the model lies the central outcome: women's perception of security in public transport. This is shaped by the aforementioned independent variables, reflecting a complex mosaic of individual and collective experiences, environmental cues, and societal influences.

3. Methodology

As discussed in Chapter 1, the objective of this research is to evaluate the perception of security measures in public transport for women, with a focus on how technological advancements enhance the existing security systems and how they can revolutionize future security systems. To achieve a rigorous understanding of women's experiences and perceptions regarding security in public transport, various qualitative data collection techniques have been employed. In total, 10 female participants agreed to take part in the study.

This chapter delineates how participants were recruited, their backgrounds and their implications in the study, and the methods that were utilized, including travel diaries onboard, semi-structured interviews, the type of analysis used as well as the ethical considerations with a particular attention to the challenges faced due to my position as a male researcher.

3.1. Researching women's feeling of security in Brussels' public transport

The decision to focus on women as the primary subject of this research stems from a recognition of their unique experiences and challenges in public transportation settings. Women often face distinct security concerns, including harassment and safety issues, which can significantly influence their mobility and access to urban opportunities (Kearl, 2010). By centering women in this study, a light is shed on these gender-specific experiences and contribute to a body of knowledge that is crucial for creating more equitable and safe transportation environments.

Brussels, as the de facto capital of the European Union, presents a fascinating microcosm of urban transport dynamics. The city's diverse population, complex mobility patterns, and status as an international hub of policy and culture provide a rich context for exploring how women navigate and perceive security in public transport. The choices and constraints within this setting offer insights into broader societal and infrastructural issues that can inform both local and international discussions on urban transport policies. According to Stand Up Against Street Harassment, 88%% of women in Brussels have experienced harassment on the street (Deprez, 2023). IVOX reports that 95% of women "sometimes" do not feel safe, while "1 in 6 "rarely" or "never" feel safe (The Brussels Times, 2023).

Security in public transport is a critical issue that affects the usability and accessibility of urban mobility solutions. The perception of safety can either enable freedom of movement and enhance the quality of life or act as a barrier, limiting participation in the urban sphere (Trafton, 2019). With rising concerns about urban security, particularly for women, this research seeks to understand how security measures, infrastructural designs, and societal norms converge to shape the public transport experience.

3.2. Sampling and distribution method

This section discusses the sampling process, the external validity of the project, and the unique challenges faced as a male researcher exploring a topic deeply rooted in women's experiences. The sampling strategy employed in this research was critical in capturing a diverse range of experiences regarding women's perceptions of security in public transport.

Initially, the recruitment strategy involved directly approaching individuals at public transport stations in Brussels. This approach, however, encountered unexpected challenges. Brussels presents a unique social environment where individuals using public transport are seldom approached by strangers, except in cases of solicitation or begging. This hesitancy among the public may be influenced by the city's rising number of homeless people, which surged from 1,724 in 2008 to 7,134 in 2022, marking a +313% increase in 14 years (Paquot, 2023). Such a significant rise in homelessness could contribute to a normalized practice of avoiding unsolicited interactions, impacting the feasibility of recruiting participants directly in public spaces, especially as a male researcher. The reluctance of passengers to engage with unsolicited approaches made it difficult to establish the initial contact necessary for recruitment, highlighting the importance of considering the cultural and social dynamics of research settings.

Instead, participants were recruited through a varied approach, utilizing my work environment, personal acquaintances, and social media platform (specifically my own Instagram's personal feed and reposts from friends). Acquaintances proved to be a valuable source, enabling the inclusion of participants from my immediate social circles who could provide honest and open accounts of their experiences. Additionally, the use of social media was instrumental in reaching a wider audience, inviting participation from individuals who might not be directly connected to my personal or professional networks. This diverse recruitment strategy was aimed at ensuring a broad spectrum of experiences and perceptions was represented in the study. However, the sample does not fully represent the broader population of women who use public transport, particularly those from different socioeconomic, cultural, or geographical backgrounds. Furthermore, not all participants resided in Brussels (namely Adriana and Juliana). Some commuted daily from other regions. In Wallonia, the French speaking region of Belgium, the public transport system is operated by TEC, partially managed by Keolis, whereas De Lijn serves the northern region of Flanders. STIB/MIVB specifically facilitates travels within Brussels. Nationwide, train services are provided by SNCB/NMBS. This diversity in public transport operators across Belgium enabled comparisons to be drawn among the various companies.

Pseudo	Start date	End date	Interview	Age	Birthplace	Area	Neighbourhood
Juliana	18-nov	02-déc	16-déc	21	Argentina	Student	Overijse (Flanders)
Joanne	22-nov	06-déc	16-déc	29	Argentina	Tourism	Schuman
Carolina	23-nov	07-déc	04-janv	32	Spain	Social	Schaerbeek
Jocelyne	23-nov	07-déc	28-déc	64	Belgium	Tourism	Ixelles
Adriana	27-nov	11-déc	28-déc	25	Brazil	Technology	Liège (Wallonia)
Viviane	28-nov	10-déc	20-déc	33	Belgium	Social	Schaerbeek
Susana	04-déc	18-déc	16-janv	33	Spain	Social/Tourism	Ganshoren
Juliette	08-déc	22-déc	09-janv	41	France	Arts/Social	Schaerbeek
Chloé	08-déc	22-déc	17-janv	27	Belgium	Social	Schaerbeek
Marta	12-déc	26-déc	12-janv	33	Spain	Tourism	Etterbeek

Table 3.1: Participants' timetable and background profiles

The diverse cultural backgrounds of participants, which is also representative of the cultural diversity of the city, facilitated numerous comparisons and offer unique insights and adding valuable perspectives to the understanding of Brussel's context. Participants' age, which varied from 21 to 64 years old, provided a diverse range of perspectives, enriching the study's findings. It was later found that most participants were approximately my age, with the average age closely mirroring mine.

One potential downside of self-selecting participant to become part of this research is the likelihood that these individuals may be particularly opinionated about insecurity, possibly due to negative personal experiences. This selection bias could mean that the study disproportionately represents the views of those who have encountered security issues firsthand, skewing the overall picture of women's perceptions of security in public transport. Women who do not perceive insecurity as a problem, or who have not personally faced security concerns, might be less inclined to participate in the research. Consequently, this could limit the diversity of experiences and perceptions captured, potentially overlooking the nuances of security feelings among a broader spectrum of public transport users.

While the recruitment strategy aimed to capture a wide range of experiences, it is important to address the external validity of the research. The study's findings, while providing valuable insights, might be limited in their applicability to other contexts or settings. The specificities of the public transport environment in Brussels and the unique experiences of the sample population may not be transferable to other cities or public transport systems.

3.3. Travel diaries as a research tool

Travel diaries, as a qualitative data collection tool, offer a unique and rich source of data for Interpretative Phenomenological Analysis. They provide detailed insights into women's experiences from the moment they leave their house until they reach their destination (see appendix I). This continuous narrative allows capturing the nuances of their journey, including their thoughts, feelings, and interactions, travel diaries enable researchers using IPA to delve into the subjective and complex nature of travel experiences (Cudjoe, 2022). This method aligns well with the idiographic focus of IPA, which seeks to explore the particularities of individual experiences in depth. Utilizing diary methodologies in research entails having participants document insights about their perceptions, actions, or reflections in a written or verbal manner, which can subsequently be analyzed through various analytical techniques. The advantage of employing diary methodologies is their ability to encapsulate "life as it is lived" (Bolger et al., 2003, p. 580) by obtaining reliable daily information. Diaries essentially provide researchers entry to realms of knowledge that may be challenging to explore through alternative research methods like observations or singular surveys (Day & Thatcher, 2009). The diary method empowers participants to act as co-researchers, enabling the collection of self-related data that might otherwise be challenging to observe or document.

The in-depth nature of travel diaries facilitates a longitudinal perspective, allowing for the tracking of changes and patterns over time. This is particularly significant in understanding how perceptions of security might fluctuate based on different variables such as time of day, specific routes, or varying circumstances (Bolger et al., 2003). Furthermore, the travel diaries can reveal the live impact of contextual factors, such as crowdedness or the presence of certain demographics, on the participants' sense of security (Tirachini et al., 2013).

While travel diaries offer a rich source of qualitative data, there are several downsides to utilizing this research method that require careful consideration. One of the primary challenges is the potential for inconsistent diary entries due to participants' varying levels of commitment or understanding of the task. This can lead to gaps in data or entries that lack the depth required for meaningful analysis (Prelicpean et al., 2018). Additionally, the reliance on self-reporting introduces the possibility of recall bias, where participants may inadvertently omit or alter details about their experiences (Alaszewski, 2006). The subjective nature of diary entries also means that data can be heavily influenced by the participants' current emotions or states of mind, which might not accurately reflect their typical experiences or perceptions (Bolger et al., 2003).

Maintaining a diary over a period can also be seen as burdensome by some participants, potentially affecting the quality and quantity of the data collected. This burden may lead to a selection bias, where only those with the time, interest, and capacity to engage fully with the diary process continue, possibly skewing the sample towards certain demographics or personality types (Zimmerman & Wieder, 1977).

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At the beginning of this phase, participants were assured of their anonymity, a promise that was reiterated before beginning the interviews. Instructions were communicated either verbally or through WhatsApp. For those I did not meet in person, an example of a diary entry was also provided as a reference guide.

They were instructed to document their experiences, observations, and feelings concerning security measures in place on their travel diaries throughout their journey on public transport. In total 95 entries were generated. 9 out of the 10 participants preferred using the online version, which was distributed through Google Docs. Only one of the participants preferred the physical version (see Figure 3.1).

The aspects covered in the travel diaries included:

- Time and date
- Lines of transport used
- Alone or accompanied
- Purpose of travel
- Perceived safety and incidences, if any, of harassment, discomfort, or other security-related issues

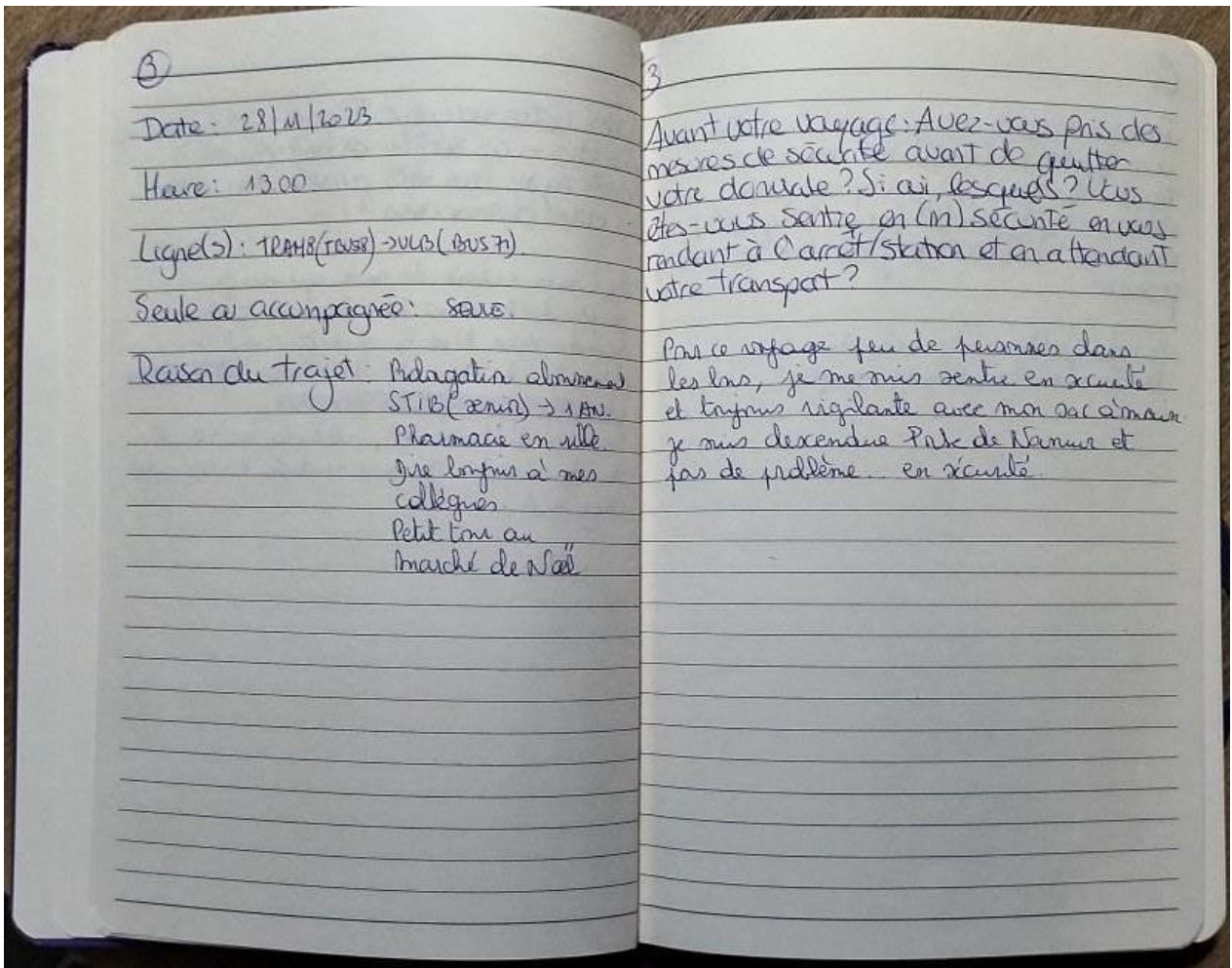


Figure 3.1: Jocelyne's diary entry nr.3

In the travel diaries used for this study, participants were guided by three main questions, each tailored to a specific phase of their journey in public transport. The first question focused on the pre-travel phase, capturing anticipations and preparations before the trip. The second question delved into the transit phase, documenting real-time experiences and observations during the journey, including interactions with various transport modes and lines. Finally, the third question addressed the post-travel phase, exploring participant's experiences and feelings from the last public transport stop to their final destination, thus providing an extensive view of the entire travel experience from start to finish.

The questions were designed to be as open-ended as possible, allowing participants the flexibility to provide detailed and descriptive accounts of their experiences. This approach was adopted to facilitate the collection of rich, narrative data, crucial for elucidating the subtleties in participant's perceptions of security within the public transport context.

A critical component of the methodology involved providing clear instructions to the participants regarding the completion of their travel diaries (Ocejo and Tonnelat, 2014). Participants were given a period of two weeks, ranging from mid November to end of December 2023, in order to document their experiences, with the stipulation that they record an entry for every individual public transport trip taken during this period. This duration was selected to ensure a comprehensive collection of data that could capture a variety of experiences across different days and times, thus providing a representative sample of each participant's typical public transport usage. The timing of the diary distribution may have influenced the nature of the experiences documented by the participants. Shorter days often result in increased darkness during commuting times, which could heighten concerns about personal safety on public transport. As Robert Williams (2008) has emphasized in his studies: "The night is much more than the absence of daylight, it is a moment when a variety of practices and emotions gain traction within a particular space-time that induce a special atmosphere, associated with particular activities, experiences and possibilities."

For the purpose of this study, a 'trip' was defined as a single journey from one destination to another. For instance, traveling from home to work or from work to the gym. Participants were instructed to complete one diary entry for each trip, ensuring that distinct experiences and perceptions associated with different journeys were individually captured. This approach allowed for the collection of detailed, trip-specific data, providing insights into the various factors influencing women's sense of security during different types of journeys.

The use of travel diaries in this research also served as a foundational tool not only for gathering initial data but also as a critical preparatory step for the subsequent interviews. Firstly, the diaries facilitated a deep engagement with the participants' experiences. By documenting their journeys, participants reflected on their perceptions of safety, encounters with security measures, and instances of discomfort or harassment. This introspection enabled a more profound exploration of their subjective experiences, which is central to the phenomenological inquiry. Secondly, the diaries acted as a bridge between the participants and the researcher. By reviewing the diary entries prior to the interviews, I gained insights into each participant's unique experiences and concerns. This pre-interview review allowed me to tailor the interview questions more closely to each participant's narrative, enhancing the relevance and depth of the interview discussions.

Moreover, the diaries provided a continuous record of experiences over a specified period, offering a comprehensive view of the participants' journeys within the public transport system. This continuity and detail aided in identifying patterns and themes that might not have been evident in a single interview session. For instance, recurring concerns about certain types of security measures or particular times of day when unease was heightened could be pinpointed and explored further in the interviews.

3.4. Semi-structured interviews

In complement to the travel diaries, this research employed semi-structured interviews as a vital methodological tool to gain deeper insights into women's perceptions of security in public transport. As argued by Tonnelat and Kornblum (2017), diary methods assisted them to “determine what riders actually do, rather than what they think they do when they are interviewed in other locations” (p.231). Since taking public transport is a habitual activity in which passengers often engage in an automatic manner, the diaries provided a solid foundation for the subsequent interviews. Semi-structured interviews are widely recognized for their flexibility and depth, allowing for the exploration of topics in an open yet focused manner (DiCicco-Bloom & Crabtree, 2006). Furthermore, they were chosen for their ability to facilitate a conversational yet guided exploration of participants' experiences and perceptions. This format is particularly suited for exploring complex and personal subjects, as it allows participants to express their thoughts and experiences in their own words while enabling the researcher to probe deeper into specific areas of interest (Adeoye-Olatunde & Olenik, 2021).

To ensure participant comfort and safety during the semi-structured interviews, several measures were taken, including conducting interviews in safe, neutral locations that participants found comfortable; offering flexible scheduling to accommodate their availability; clearly communicating the research aims and ensuring a thorough understanding of the informed consent process. Consent was obtained to record the interviews, and participants were guaranteed anonymity

Each interview began with a set of open-ended questions designed to elicit responses about the participants' experiences with public transport (see appendix II). The questions were developed based on the thematic areas identified in the travel diaries and existing literature on women's security in public transport. Flexibility was maintained to follow up on interesting or unexpected responses, allowing for the emergence of new themes and insights (Magaldi & Berler, 2020).

Semi-structured interviews proved to be an invaluable methodological tool in this research, providing depth and context to the qualitative data gathered from the travel diaries. By combining both methods, this study offers a rich understanding of women's perceptions of security in public transport, contributing significantly to the field of gender studies and urban transportation research.

The semi-structured interviews were audio-recorded with the consent of the participants. These recordings were then meticulously transcribed, converting the verbal data into written text. The

transcription process was thorough, capturing not just the spoken words but also noting any relevant non-verbal cues or inflections, which provided additional layers of meaning to the respondents' answers. Only three participants preferred to conduct the interview in English, while the rest were conducted in French. Consequently, the original quotes used in the Findings chapter (Chapter 4) had to be translated.

3.5. Interpretative Phenomenology Analysis (IPA)

This research adopts Interpretative Phenomenological Analysis (IPA) as its primary methodological framework, a qualitative approach particularly suited to exploring the nuanced and subjective experiences (Delve & Limpacher, 2023c). Developed by Jonathan Smith in the mid-1990s, IPA allows for a deep exploration of how individuals make sense of their personal and social worlds (Smith et al. 2009). Interpretative phenomenological analysis (IPA) is a contemporary qualitative methodology. Whilst its roots are in psychology, it is increasingly being drawn upon by scholars in the human, social and health sciences (Charlick et al., 2016). The choice of IPA is driven by its emphasis on understanding the lived experiences of participants and its capability to provide detailed and intimate insights into how women perceive and navigate security in public transport. IPA is grounded in phenomenology, hermeneutics, and idiography (Smith & Fieldsend, 2021). It draws upon the phenomenological focus on exploring how people experience the world, the hermeneutic theory of interpretation and meaning-making, and the idiographic commitment to understanding how a particular phenomenon is experienced by an individual (Smith, 2004).

As argued by Noon (2018), the objective of interpretative phenomenological analysis (IPA) is to thoroughly investigate how individuals understand and interpret their personal and social experiences. The primary focus of an IPA study is on the specific meanings that experiences, events, or states have for the individuals involved. It aims to delve into one's personal experiences and perceptions regarding an object or event, rather than trying to create an objective description of the object or event itself. Indeed, IPA is focused on capturing the personal experiences of individuals by encouraging them to share their stories in their own words, treating them as experts of their own experiences. However, IPA makes an “explicit commitment to person-in-environment and not just phenomenon-as-experienced” (Quest, 2014, p. 43). Researchers are required to concentrate on the life experiences of participants as they are influenced by social, historical, and cultural contexts (Eatough & Smith, 2008).

Therefore, IPA goes beyond mere description. Researchers are tasked with interpreting and conveying the significance of these experiences within the unique contexts of the respondents (Noon, 2017). IPA's emphasis on exploring individual experiences required the creation of an interview guide and travel journal that were both open-ended and flexible, allowing participants to share their stories and perceptions freely. Questions were designed to encourage participants to reflect on their experiences and the meanings they attributed to them. As a researcher, IPA demanded a high level of reflexivity and self-awareness, particularly through the process of bracketing, setting aside preconceptions and biases to engage with the data in a fresh and open

manner. This was crucial for maintaining the integrity of the interpretative process, allowing the participants' voices and meanings to emerge without being overshadowed by my interpretations or theoretical predispositions. To achieve this, a commitment to empathetic understanding, looking to grasp the participants' lived experiences as fully and authentically as possible was needed.

While smaller sample sizes in IPA research might prompt concerns about the representativeness and the broader applicability of findings, leading to challenges in publishing such studies (Charlick et al., 2016), the emphasis in IPA is on in-depth exploration rather than breadth. As Hefferon & Gil-Rodriguez (2011, p. 756) articulate: "a detailed, profound analysis of a smaller group is invariably more valuable than a superficial, merely descriptive examination of a larger number". This approach entails a careful stance regarding overgeneralization. Educational researchers utilizing IPA should focus on the insights and understandings specific to a particular group within their context. Smith and Osborn (2003) argue that the power of IPA lies in its theoretical generalizability, allowing readers to connect the study's findings with existing literature and their own experiences, rather than empirical generalizability. This approach does not negate the potential of IPA to support broader claims; rather, it suggests that wider assertions can emerge gradually through the accumulation of similar studies.

In the context of this study, IPA offers an effective lens through which the varied experiences of safety and security, as perceived by women in Brussels' public transport system, can be deeply understood.

Noon and Hallam (2018) also argue that researchers may also face "dualistic tension between idiographic commitment and the search for connection across cases" (p. 81). This tension may arise when putting emphasis on commonality of experiences, which can eventually lead to individual experiences to be blurred.

3.5.1. Data Analysis and coding process

As mentioned previously, the analytical phase of this research employed Interpretative Phenomenological Analysis (IPA) to dissect and understand the collected data from travel diaries and semi-structured interviews. The first step in the analytical process was the digitization of the travel diary, which was the chosen method for one participant only (Jocelyne). This involved converting the written diary entries into a digital format, which facilitated easier handling and analysis of the data.

The insights gained from the travel diaries allowed the development of tailored questions for the semi-structured interviews. While the interview questions were mostly pre-determined, the diary analysis provided the opportunity to customize additional questions that addressed specific themes or incidents noted in the diaries. This approach ensured that the interviews were responsive to the individual experiences of the participants, thereby enriching the data collection process.

The transcribed interviews were then subjected to a detailed IPA analysis. This involved a line-by-line examination of the data, identifying, and interpreting the themes that related to the research question. The process was reflective and interpretative, as elucidated by Smith et al. (2009), seeking to understand how participants make sense of their experiences of security in public transport. For the analysis, interviews were carefully transcript and imported into Atlas.ti, a software that assists in in the coding processing the data into datasets. Doing so allows for a search of patterned regularities (Saldaña, 2009). The first phase of the analysis consisted of creating quotations for each statement that was made. The quotations were then coded according to their relevant themes. The coding was open-ended, using no preset codes and letting the data itself guide code creation. A complete overview of the codes – divided into code groups – can be found in appendix III. To ensure accuracy, the coding process was repeated, verifying that each quotation was appropriately and accurately coded. The diary entries were not coded but were diligently read, classified and integrated into the analysis, often serving as examples to support statements and arguments derived from the interviews. This ultimately resulted in a story encompassing the experiences of women traveling by public transport within Brussels, which can be found in chapter 4.

3.6. Ethical considerations and challenges as a male researcher

As a male researcher delving into a topic predominantly concerning women's security, there were inherent challenges and considerations. The primary concern was ensuring that the research was conducted with sensitivity and respect for the experiences being shared. It was crucial to create a safe and comfortable environment for participants to openly discuss their experiences. Acknowledging my positionality as a male researcher was vital in approaching the interviews and analysis with an awareness of potential biases and ensuring that the participants' voices were accurately and empathetically represented. This reflexivity was an ongoing process throughout the research, requiring continual self-awareness and adaptation to maintain the integrity and sensitivity of the study. Being a frequent public transport user, I could empathize with the participants, trying to understand their thoughts and feelings. On numerous occasions, I've reflected on how a woman might perceive certain situations I've encountered in public transport in Brussels, pondering whether my gender could have impacted the outcome of the situation. There is also an inherent limitation in understanding and interpreting these experiences from an outside perspective. Despite efforts to approach the research with empathy and reflexivity, my interpretation of the data may not fully capture the depth and nuances of the participants' lived experiences. Given the personal nature of the interview topics, ethical considerations were particularly pertinent. During the interviews, participants demonstrated a greater willingness to disclose their concerns and experiences, a phenomenon that resonated with my own observations.

Maintaining constant communication through WhatsApp, I hoped to remain as accessible as possible, balancing the act of sending daily reminders without being overly intrusive. Especially with participants that I did not know personally. Additionally, not all participants could be met in

person; two interviews (Juliette and Chloé) were conducted via Teams, which, while effective, presented limitations in interpreting participants' body language.

The interpretative aspect of IPA suggests that findings reflect the researcher's perspective, although measures are taken to minimize such influences (Noon & Hallam, 2018).

Having outlined the methods used, recruitment process as well as the challenges encountered, within this methodological chapter, the upcoming findings section will unveil how infrastructure, technology, and human interaction influence women's feelings of safety within the public transport system, offering insights into creating a safer and more inclusive environment.

4. Findings: The dynamics of safety perceptions of women in Brussels public transport

In this chapter, the outcomes of the study will be presented, guided by Interpretative Phenomenological Analysis in order to explore the security perceptions of women using public transport in Brussels. The analysis, drawing from interviews and travel diaries, seeks to explore the concerns and experiences shared by the participants. The findings, while specific to the context of this study, shed light on several key themes that resonate with broader concerns about safety and mobility for women in urban environments. The study focused on the dynamics of women's perceptions of safety in public transport of Brussels. Flemish weekly magazine BRUZZ (2022) reports an increase in violence on public transportation in Brussels, occurring both within metro and train stations and onboard the vehicles of STIB/MIVB, De Lijn, and SNCB/NMBS. In 2021, a total of 640 cases of physical violence were registered, up from 534 in 2020 and 549 in 2016, but with numbers comparable to 644 cases in 2012. According to the news agency, the federal police note a significant portion of these incidents occur in metro and train stations, speculating that increased police and security presence during the pandemic might have led to more infractions being recorded.

These themes serve as a foundation for the discussion that follows in chapter 5, with the hope of contributing to the ongoing conversation around improving women's security in public transport. The chapter opens with contextual background on Brussels' public transport and urban challenges, with a focus on security concerns of the city, followed by experiences of harassment, and the impact of infrastructure and human factors on safety perceptions. The chapter concludes by discussing the role of modern technologies in enhancing public transport safety.

4.1. Unpacking Brussels' dynamics

Along with the Walloon Region and the Flemish Region, the Brussels-Capital Region is one of the three regions of Belgium. Public transport in Brussels is extensive and is mostly operated by public company STIB/MIVB, encompassing metro, tram and bus lines. Train services are operated by SNCB/NMBS, the national railway company. With an extensive network allowing travelers to reach different parts of the city efficiently (Visit.Brussels, n.d.). The city has been actively working towards modernizing and making its public transport system more sustainable. For instance, a substantial loan agreement was signed with the European Investment Bank to finance the

modernization and extension of the region's urban transport fleet (European Investment Bank, 2022). This improvement is mirrored by Juliette's interview extract on the newest generation of metros: "The subway or tram cars. You know, there are several generations, and it's certain that the newer generations are more reassuring because they are cleaner, you know? They give you a feeling of being cleaner. Whereas with the old subways, as soon as you're inside, well, the handle alone, you don't want to touch it, and they are, they're filthy to death. You know? The experience is not the same. Quality plays a role in that."

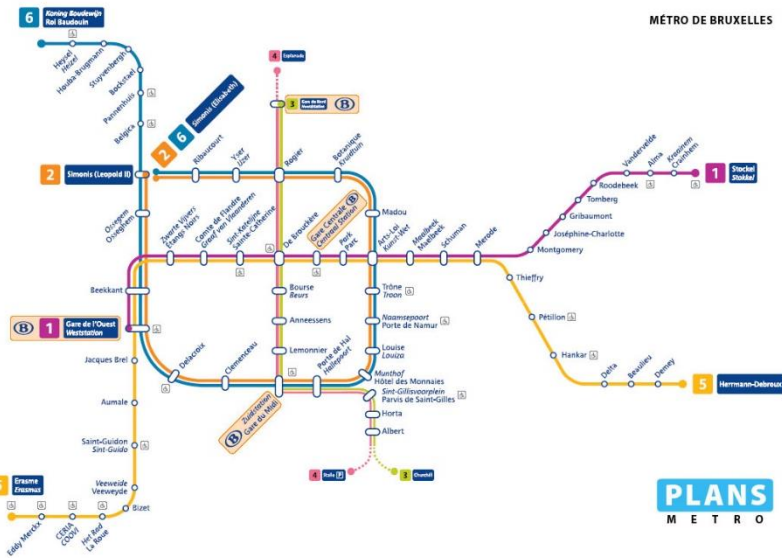


Figure 4.1: Metro (Lines 1, 2, 5, and 6) and pre-metro (3 and 4) system in Brussels

However, this modernization has arguably deepened the city’s inequalities, as confirmed by Carolina’s diary entry: “I find lines 2/6 to be very unpleasant metros. They are very noisy and old, which does not contribute to a comfortable feeling inside. And I have always found the gap or disparity between lines 1/5 (more touristy, EU, very well-maintained and cared for) and lines 2/6 (not modernized at all, old, dirty) to be outrageous.” Indeed, Brussels metro system efficiently reflects the socio-economic disparities of the city

(see figure 4.3.). Lines 2 and 6 primarily serve less affluent areas located on the west side of the canal, while lines 1 and 5 cater to more affluent neighborhoods (Costa & de Valk, 2021).

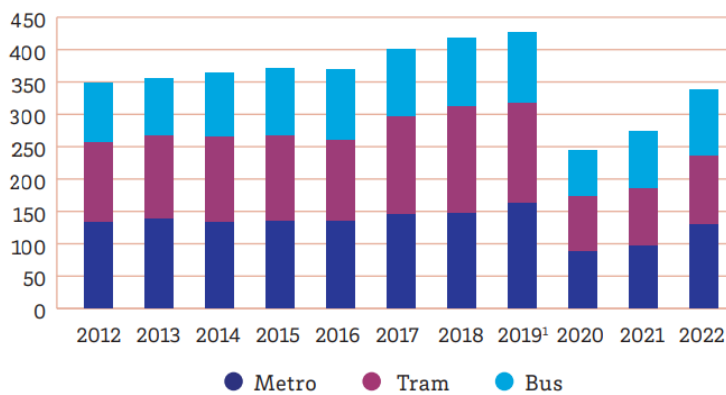
Moreover, Brussels has a significant issue with traffic congestion, partly due to car usage within the city. A study by traffic data supplier INRIX (2022) ranked Brussels as the sixth most congested city in Europe. The dense urban layout and prominence as a political and economic hub have contributed to heavy reliance on cars, often leading to gridlocks during peak hours.

The city's new traffic plan, named ‘Good Move’, which was enacted in August 2022, aimed to restrict car use in the city center by introducing one-way streets and limited-access zones (Bruxelles Mobilité, 2021).

Another larger plan aims to reduce car traffic by 24% by 2030, diverting cars from the city center to the ring road, and prioritizing public transport and other priority vehicles on some major roads (Hernández-

EVOLUTION OF THE NUMBER OF JOURNEYS ON THE STIB PUBLIC TRANSPORT NETWORK

Millions



Source: STIB
¹ Break in time series

Figure 4.2. : Evolution of the number of journeys on the STIB/MIVB public transport network (in millions)

Source : Brussels Institute for Statistics and Analysis (BISA) (2024)

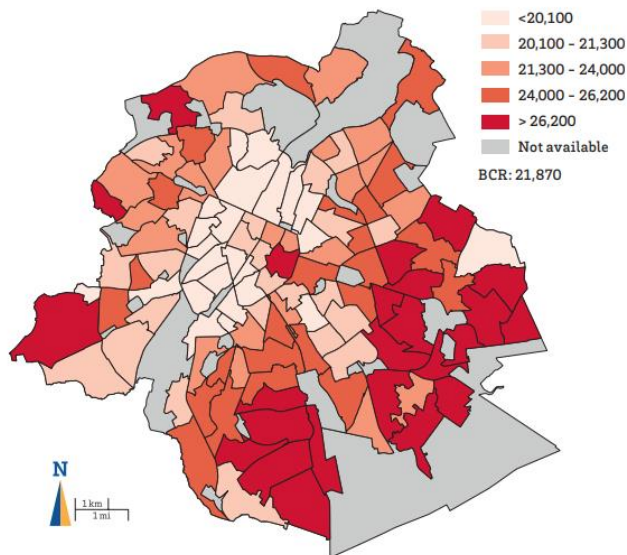
Moralez, 2022). A trend of increasing public transport journeys in Brussels across Metro, Tram, and Bus services from 2012 to 2019, followed by a sharp decline in 2020 and 2021, but still recovering in 2022, as illustrated in Figure 4.2.

4.1.1. Lack of security concerns

The perception of insecurity in Brussels can be a multifaceted issue. The city naturally attracts a diverse populace, which can sometimes lead to cultural or social tensions (De Backer, 2022; Torrekens et al., 2023). Brussels experiences considerable spatial and ethnic segregation, with ethnic minorities predominantly residing in the economically challenged central, a situation resulting from historical stratification, labor migration patterns, and spatial development (Costa & de Valk, 2021; Sacco et al., 2016; Van Hamme et al., 2016). Some areas face significant socio-economic challenges, including exceedingly high unemployment, elevated school dropout rates, and prevalent drug trafficking issues. These areas commonly constitute the “croissant pauvre” (poor croissant) and tend to concentrate around the central areas of the city, as shown in figure 4.3.

MEDIAN TAXABLE INCOME OF TAX RETURNS BY DISTRICT IN 2021¹

Euros per tax return



Sources: BISA & Statbel (Fiscal statistics on income)
Monitoring des Quartiers - BISA © Brussels UrbIS **
¹ 2022 financial year, 2021 income

Figure 4.3: Income disparities of Brussels in 2021
Source : Brussels Institute for Statistics and Analysis (BISA) (2024)

The report "Moniteur de sécurité 2021" from the Federal Police of Belgium (2022) covers a variety of security-related themes based on a survey conducted among the population. The survey explores issues such as neighborhood problems, feelings of security or insecurity, victimization, the propensity to report incidents, among others.

Over the years, there have been reports of increased violence or crime in certain areas, or during specific times, which may contribute to a feeling of insecurity among residents and visitors alike. Table 4.1. shows how feelings of insecurity are perceived based on gender in residents of the city with almost 40% of women claiming that they “sometimes” feel insecure, while 4.88% “always” do. Avoiding certain places is also higher among women than men, as shown in Table 4.1.

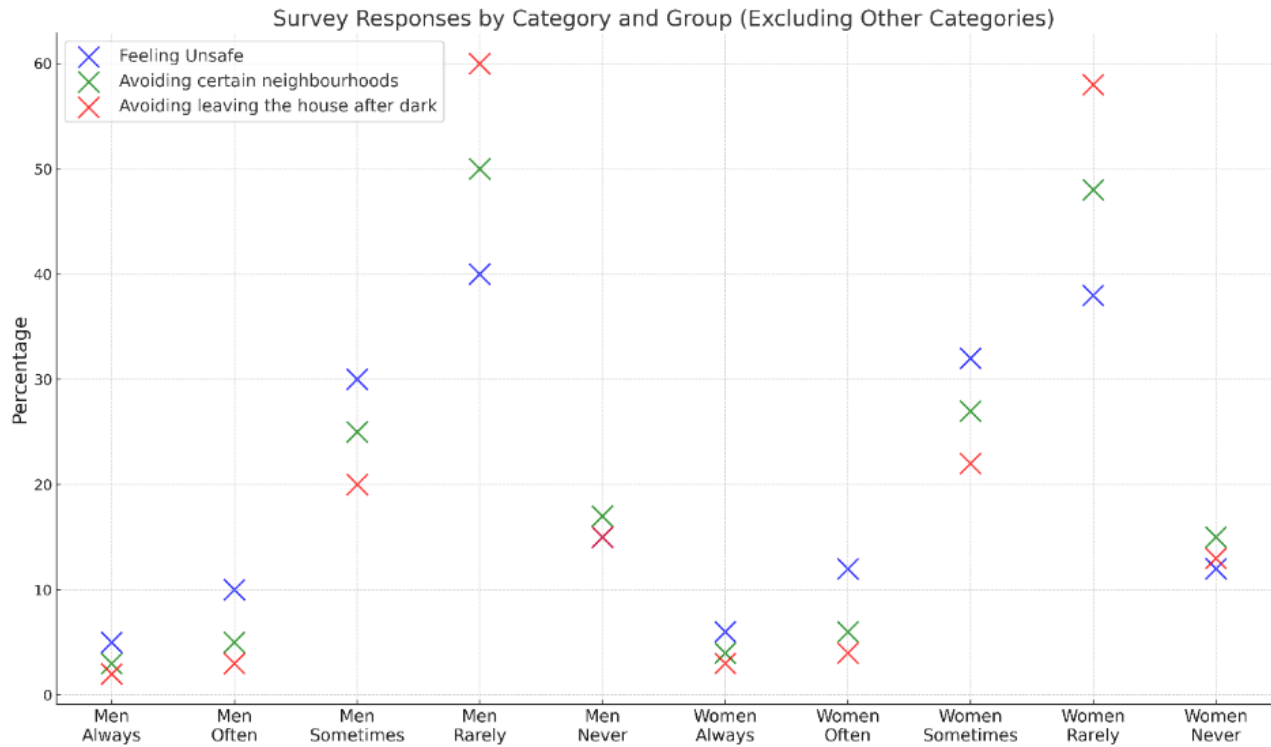


Table 4.1. : Feeling unsafe, avoiding certain areas and avoiding leaving the house after dark, by sex.

Source : Federal Police (2022)

Most diary entries showed that participants generally did not feel unsafe on their trips, despite taking many daily precautions such as keeping a phone charged, watching out who is around them or avoiding suspicious individuals. An example of a journal record that illustrates feelings of insecurity: “I went down in Parvis de Saint-Gilles, sometimes I anticipate an unsafe feeling when I got there cause there use to be a lot of drunk/homeless people on that stop. Yesterday it was only two of them doing music and it was quite calm. But it can be a difficult stop regarding safeness feelings.” (Carolina). During the interviews however, it was surprising to learn to what extent women have to deal with safety-related feelings on a daily basis, as this was not so much reflected in the diaries.

During the interviews, harassment and catcalling were the most prevalent issues, highlighted by the frequent use of the code 'Harassment' and discussed by 9 out of the 10 participating women. Jocelyne, who also happens to be the oldest participant (61 years old), was the only woman who did not discuss harassment issues. Instead, her narrative focused more on robberies and pickpocketing incidents.

Juliette, mentions that she frequently commutes through the North Station, a neighbourhood often associated with precariousness and danger. She once related in her diary when exceptionally doing the trajectory by foot: "Nevertheless, and despite the lively atmosphere of the neighborhood, I felt a certain insecurity. I therefore preferred to avoid the Gare du Nord and

walk to Rogier by choosing a route that goes under the train tracks (which I never take on foot when I am alone, especially not at night). Under the bridge, I noticed a man moving too close on my right side (which is the side where I carry my handbag when it's slung across my body)." The essence of Juliette's experience challenges Goffman's 1963 theory on 'open social order', which might oversimplify the complexities of urban public spaces. While Goffman argues for a universal adherence to social norms that foster harmonious interaction among strangers, Juliette's discomfort suggests that these norms are not always sufficient to ensure a sense of security and personal safety.

There also seems to be a cycle where incidents of terrorism lead to intensified security debates followed by political initiatives, which eventually wanes only to be reignited by another incident. This cycle indicates a persistent undercurrent of security concerns within the Brussels community (Mincke, 2010). It can be best illustrated by the recent terrorist attack where 2 Swedish citizens were murdered near the metro station of Yser and the political reaction that followed thereafter (Wright, 2023). During the interviews, terrorist attacks were relatively often discussed. Particularly, the terrorist attacks on March 22nd of 2016 in Brussels significantly impacted the city's population, targeting its public transportation system at the Brussels Airport and Maalbeek metro station (Chad et al., 2016). The choice of targeting a metro station accentuates the vulnerability of public transport systems to terrorism (Devroe & Ponsaers, 2021). Such incidents instill fear and anxiety among citizens, potentially deterring individuals from utilizing public transport due to safety concerns. Carolina's diary entry clearly exemplifies this: "I don't like taking lines 1 or 5 between Schuman and Sainte-Catherine (downtown) during rush hour when it's crowded. Sometimes the metro makes me anxious. This year (2023), I read a lot of press articles about the trial for the attacks in Brussels, and I think it made my experience a bit more anxiety-inducing. Some of the articles were very violent (or had too explicit narratives). I even had nightmares at the time. And when I have to take the metro and it's crowded, sometimes I feel very stressed. I try to bike more, but when the weather is really bad, I still take the metro." Carolina's diary entry provides a poignant illustration of the tension and discomfort experienced by some individuals using public transport. Her account of feeling anxious and stressed on crowded metro lines, exacerbated by the media coverage of the trials for the attacks, contrasts with the concept introduced by Bovo et al. (2023), which posits that public transport can transform travel from an individual to a collective human experience. This concept, termed 'being with,' suggests that the act of commuting should ideally foster a sense of community and shared experience among passengers, transcending personal isolation.

Post-terrorist attacks, public transport authorities in Brussels, like many other cities facing similar threats, are challenged with maintaining the accessibility of transit systems while ensuring the safety and security of passengers. Brussels has a complex situation with 19 mayors governing 19 different Dutch-speaking and French-speaking municipalities. These municipalities are divided into six local police "zones". Devroe & Ponsaers (2021) argue that the divided police organization leads to fragmentation, malfunctioning, limited information sharing and political conflicts. Fragmentations of governance can be felt in other areas of the city as well, such as in the inability to tackle prominent drug-problem or homelessness (Paquot, 2023). This topic will be further discussed in the next sub-section.

4.2. Vigilance and harassment

The themes of vigilance and harassment emerged prominently in participants' narratives, illustrating the pervasive impact of these experiences on their daily commuting habits, sense of personal safety, and overall well-being while using public transport.

Some of the participants cited being or having been in a constant state of vigilance: “And is just in this kind of situations that I'm like, okay, I have to be aware of what is happening around me, even if I should do that always. But in this kind of situations, it's like, okay, no. It's almost like I'm in danger. Um, and it's... it's... it doesn't feel good”. Joanne recounted in her interview when encountering someone struggling with mental issues while waiting for her metro. She continues: “And it's in those kind of situations that I'm like, where's the police? Where's the security? Is anyone doing something here? Anyone is looking at the cameras and seeing like, oh, maybe we should check this... No one”. Encounters like the one described by Joanne seem to occur frequently in Brussels (Burrion, 2024). The issues of homelessness and drug problems now appear insurmountable, with authorities' lack of action becoming a normalized expectation. Viviane also mentions during her interview the problem of the lack of follow-up: “Often, if something happens, let's not kid ourselves that most of the time afterwards, there's no follow-up. And that's what really creates the problem. In fact, it's not at all about whether there are no cameras or if there are cameras. It's about the fact that afterwards, what's done with it, isn't going to be much. And it's mostly that what creates the situation where women have to be more cautious in public transport and stuff like that.” Drawing from Heebels and van Aalst's (2020) study on the cultural and collective aspects of CCTV surveillance, Viviane's concerns about the lack of follow-up actions in public transport security incidents underscore a significant shortfall in the surveillance process. Despite the sophisticated monitoring and interpretation of CCTV footage, the critical gap lies in the subsequent actionable steps, or rather the absence thereof. This disconnection highlights the necessity for a comprehensive surveillance strategy that not only captures and interprets data but also ensures effective interventions are implemented.

Despite the perception of lack of action from the authorities, which may also lead to underreporting of violent or sexual encounters, BRUZZ (2022) states that there's been a rise in sexual violence on public transport, with 155 cases reported in 2021, up from 130 in 2020 and 96 in 2016. The areas that were discussed the most and associated with feelings of unsafety were the North Station, the City Centre and the South Station (which mostly constitutes the “croissant pauvre” discussed in subchapter 4.1. Susana, has always struggled with harassment, catcalling and stalking. During our interview, she recalls a period of her life when she used to live in the City Centre: “Since I moved out of the center, I do not pay that much attention to security as I used to do. Before I paid attention to the way I was dressed, and I even had peppermint in my bag at some point. I felt in constant stress cause in any place someone could come to you and try to flirt. It does not happen that much now, for 2 reasons : I am 33 and I guess I look less accessible, and I do not live at the city center.” She now lives in a residential area in Ganshoren and does not mind crossing the local park during the night.

Chloé has been living in Brussels since October 2023 only. Even though she admitted in her interview that she does not feel particularly unsafe while on the move, she also lamented how she often faces harassment or catcalling from men loitering around her Verboekhoven stop: “Most people who use public transport also have a destination they need to reach. And I feel that this is their primary goal, whereas around the stops or things like that, there are often people just hanging around because they want to be sheltered from the weather or because there happens to be a bench there and so, it occurs to them more to bother women who are nearby since they want to amuse themselves. I don't know, I don't know what drives people to do these things.” Loitering, particularly by men, around bus stops and similar places can be linked to the appropriation of public spaces and the display of power (Dunckel-Graglia, 2013). This behavior often leads to the exclusion of others, particularly women, and contributes to feelings of unsafety due to the perceived potential for harassment or aggressive behavior. In general, bus and tram stops appear to be more vulnerable to security issues. Factors such as inadequate lighting and lack of natural and human surveillance may contribute to this feeling (Loukaitou-Sideris, 2007). In contrast, metro stations tend to cluster people more effectively, offer consistent lighting, and provide more opportunities for natural surveillance. This observation aligns with numerous studies, for instance, those by Karacho et al. (2022), indicating that women's perceptions of safety are influenced by factors including the presence of personnel and sufficient lighting. These elements are notably more prevalent in metro station environments.

Men, often of foreign origin, are usually identified as the primary contributors to women's feelings of unsafety in public spaces (Peeters, 2012). This phenomenon, to a certain extent, puts into question Anderson's theory of 'cosmopolitan canopy' (2004). The trivialization of harassment is a separate but related concern that at least 3 participants highlighted in their interviews: “But we have to be realistic, I think. Who is really going to know what women feel? Women! Because, you know, the guys... I mentioned this to a colleague at my other job. He was like 'well no, Debrouckère is just fine, everything's okay.' And I said, 'sure, Fred, but you're 1.90m tall, you see? You're a big guy, you weigh 120 kilos.' And me, I'm just small like this next to you. Sorry, but you see? The situation is quite different. People will leave you alone. Me, I'm the one who's going to get hassled” (Marta). In contemporary discourse, the trivialization of harassment in public spaces, including public transportation, emerges as a significant societal issue. This phenomenon undermines the severity and impact of harassment, perpetuating a culture of silence and complicity, as argued by Dunckel-Graglia (2013). Kearl's (2010) work on street harassment highlights how societal attitudes often downplay and trivialize such harassment, portraying it as a compliment rather than a violation of personal space and safety. This normalization discourages victims from coming forward and hinders efforts towards creating safer public spaces for everyone.

Stalking is also a prominent issue, with 6 of the 10 interviewees having shared experiences of being stalked in public spaces or while in transit using public transport. Juliana related a situation when 2 men followed her during her ride home: “I think that I prefer to walk through the streets than taking public transport. Um, it happened once that I was like taking public transport at night. It was around six, I think, and I was going back home and then there were like two guys following me. So I felt like really in danger. So I get down the bus to the, uh, Argentinian restaurant that

was nearby there and I know them all there , so I just run there.” Juliana’s distressing experience highlights the extreme dangers women can face, emphasizing the critical need for improved safety measures and societal change. In today's world, where international migration influences daily urban travel, public transportation becomes a key meeting point for global diversity (Koefoed et al., 2017). Thus, buses and trains serve as unique spaces where people come into contact with ethnic diversity and "others." A pivotal strategy in addressing and mitigating these dangers lies in the education of society from a young age, as argued by Peeters (2012).

The issue has been gaining track in the last years. A survey conducted in Belgium involving 1,000 women reveals a concerning level of perceived safety on the streets, with 95% of respondents occasionally feeling unsafe and one in six rarely or never feeling secure (The Brussels Times, 2023). This study, part of the 'Stand Up Against Street Harassment' campaign, found that over 80% of women have experienced verbal or physical harassment in public spaces, echoing the findings of previous research that street harassment is a widespread issue affecting nearly all women. Documentary maker Sofie Peeters, known for her work "Femme de la Rue" which highlighted street harassment in Brussels in 2012 (Peeters, 2012), notes a shift in perception over the years, with increased actions and some police training addressing the issue, yet the problem remains pervasive (Van Nieuwenhove, 2022). By instilling values of respect, consent, and equality early in life, there is a significant opportunity to reshape societal norms and behaviors towards women.

4.3. Infrastructure

The theme of infrastructure emerged prominently in the discussions with participants, shedding light on how the physical and operational aspects of Brussels' public transport system influence their feelings of security. This section delves into the insights provided by the participants, revealing a rich understanding of how infrastructure contributes to a sense of safety or vulnerability among women using public transport in Brussels.

Lighting stands out as the most critical infrastructural element affecting women's safety perceptions in public transport, as confirmed by participants. Even though no questions were foreseen from my side regarding lighting, this theme was a recurrent topic for 7 out of the 10 woman that were interviewed. For instance, when asked about which improvements could be made in order to improve her sense of safety, Jocelyne stated without hesitation: "Lighting. It matters, it matters for a woman. When you're alone it affects you. If you're alone, I'm alone at the tram or bus stop. I wouldn't really feel at ease". This is supported by previous research. According to Painter and Farrington (1997), improvements in street lighting have been shown to reduce crime and increase pedestrian use after dark. Similarly, Fan, Guthrie, and Levinson (2016) found that the perception of waiting times at transit stops and stations can be significantly affected by the presence of basic amenities, including lighting, which also influences feelings of security. Furthermore, Currie and Delbosc (2012) highlighted the impact of personal safety perceptions on public transport ridership, emphasizing the role of environmental factors such as lighting in shaping these perceptions.

Although, as discussed in chapter 3, there could be an influence from data collection having taken place during the winter months, prioritizing lighting improvements in public transport could undoubtedly be a key strategy for increasing women's security and comfort. Carolina further emphasized the importance of lighting, particularly in the context of the Noctis (night buses in Brussels) stops. During our conversation, she expressed discomfort in using the Noctis service partly due to the poor lighting at certain stops, which are often located in darkness: "You see, (the stop) that connects Rue de Laeken with Boulevard Anspach, I think. So, between the two, all the Noctis buses pass through. It's quite horrible, really. Because it's dark, it's completely dark. And it's... I don't know. And there's nothing, no bench, nothing. It's just a sign." This lack of lighting not only increases the waiting time's discomfort but also significantly contributes to a feeling of insecurity, especially in less frequented areas or late at night. This is in line with many studies such as Fan, Guthrie, and Levinson's (2016) or the CPTED principles (Cecatto et al., 2022).

Visibility within and around transport facilities was another critical aspect discussed. Participants expressed a preference for open, that allow for unobstructed views and natural surveillance. Areas that hinder visibility, such as poorly lit corners or stops, were sometimes cited as anxiety inducing. This can be illustrated by Chloé's claim : "I feel like there are certain tram stops. That sometimes.... I don't know. The cabin has little corners to hide...I don't know how to explain it, I



Figure 4.3.: Vandalized tram stop

find that there's better visibility in the metro galleries, where everything is linear. And then you see, you have an overall view. Or when you take the escalator, you already see pretty much everyone moving around." Participants also highlighted the significant impact of maintenance and cleanliness on their perceptions of safety. Well-maintained stations and vehicles not only foster a sense of care and attention but also signal a commitment to passenger security. For instance, the prompt repair of damaged facilities such as broken lights or vandalized infrastructure,

was seen as crucial in maintaining a secure environment. Viviane addresses this at the beginning of our interview: "And we see that this also creates a sense of security, the fact that places are not left to decay and that there's a bit of an idea that they are maintained.... But I also know that, for example, changing a window when it's broken relatively quickly, it's also to try to create a sense of security and not give the impression that the stops are dilapidated and that therefore no one takes care of them". The sentence suggests that areas with inadequate lighting or maintenance evoke stronger feelings of insecurity and neglect among individuals. These observations align with the findings of Ceccato et al. (2022), who argue that adhering to design principles such as natural surveillance, territorial reinforcement, and access control can greatly

improve safety in public transport facilities. Essentially, when these design principles (CPTED principles) are effectively incorporated into the infrastructure of public transport environments, they can mitigate feelings of insecurity by enhancing visibility, delineating private versus public spaces, and regulating access, thereby fostering a safer and more secure atmosphere for users.

On a more radical example, during our exchange, Marta discusses how common it is in the stations to see puddles of blood: “They do a lot of washings and stuff like that. But there's a lot of littering. Come on, sometimes you take the metro and you find blood stains like that, on the platform, you know?”. Marta was not the only participant expressing concerns of seeing blood on a public space, Juliette also expressed similar sightings on her street, likely linked to the territorial clashes between drug-dealers in the area of the North station (Steffens, 2023).

The accessibility of public transport facilities was another recurring theme, also concerning individuals with reduced mobility, such as those using strollers or wheelchairs. As noted by Warnicke and Kristianssen (2023), challenges in accessing certain stops or stations due to malfunctioning escalators or elevators are not only an inconvenience to passengers but also contribute to a sense of vulnerability: "I've also noticed that escalators are often out of order everywhere in Brussels, and now they change directions, etc. And often I find that they work better, but there's still the side where, as a result, sometimes it's not going the right way. And so you have a lot of stairs, a lot of things where you tell yourself, if I really had to escape quickly, I don't feel at all. I don't have... I feel tired in advance, you know? I mean, I'm never going to make it." (Juliette, interview). Through the lens of the participants, it becomes evident that infrastructure plays a pivotal role in shaping the security experiences of women in Brussels' public transport. The insights gathered underscore the need for a holistic approach to infrastructure development and maintenance, one that prioritizes accessibility, visibility, and a proactive stance maintenance and repairings.

4.4. The human factor

The human factor and the presence of personnel seem to play a pivotal role in shaping women's feelings of safety in public transport. For all of the women that were interviewed, the visibility and availability of security staff and transport personnel are not just amenities but essential elements that significantly influence their sense of security and comfort. This reliance on the human factor stems from the need for immediate assistance and intervention in situations that may arise during transit, whether it's harassment, feeling threatened, or general unease. Moreover, the human element extends beyond security personnel to include drivers, controllers, customer service representatives and police force, whose approachability and responsiveness further contribute to a safer and more reassuring travel environment. The findings also correlate with Stjernborg's recent study (2024) on triggers of insecurity on public transport of Malmö. Another study, on gender differences in the perception of safety in public transport by Aitbihiouali et al. (2019), explores the gender gap in perceived safety and satisfaction within urban public transport systems across 28 global cities from 2009–2018. Using large-scale customer satisfaction surveys, the study found significant gender disparities in safety

perceptions, with women feeling less safe than men in both metros (10% more likely) and buses (6% more likely). Aitbihiouali and her peers (2019) further noted that both metros and buses may have security measures in place, the design and operation of metro systems might not always provide the same level of visible security presence or surveillance, which can affect the perceived safety.

During the interviews, bus, tram or metro drivers emerged as the most frequently cited personnel, underscoring their importance in ensuring passenger safety, even more so than security personnel or police, who are not always present. This finding highlights the critical role drivers play in the everyday security and comfort of passengers, serving not only as operators but as frontline guardians of safety, making them indispensable in the eyes of passengers. A passage on Juliana's interview illustrates this protectiveness: "Sometimes even you tell to the driver that you're feeling not well or someone's following you and everything else, they're very, like, in your disposition to say, look, okay, 'I will stay with you' and that stuff, or 'you can stay in the bus with me and I'll wait you to take your other transport.'" A second woman shared a story where a train controller, who also happened to be a friend of hers, helped her out of trouble, when a man wouldn't leave her be: "So, luckily I knew her, like, I had her Insta and everything and I sent her a message, she rushed over. She really arrived almost running. She said, 'Sir, what are you doing here?' And all. She gave him a fine, and told him 'go sit behind'. But I was really lucky." (Adriana). This incident highlights the importance of accompaniment personnel in ensuring passenger safety and wellbeing, beyond traditional fare control duties. It also reflects the challenges of visibility and recognition faced by such personnel, where their valuable contributions to passenger safety may not always be acknowledged by the broader public (Ruud, 2023). These were the only two positive stories that were related regarding drivers/train controllers, they were told by both of the participants that did not live in Brussels.

The situation changes with interviewees that reside in the city and use the STIB/MIVB network on a regular basis. In this context, whenever the topic of drivers was discussed, stories were relatively more negative, as noted in the following diary entry: "A man who seemed to have taken substances walked through the tram smoking a cigarette without anyone saying anything (including the driver). There were fewer people in the tram and still quite a few suspicious profiles (men under the influence who were in a group). In the end, the journey was calm but I remained vigilant." (Juliette). While many theories argue for an inherent, albeit fragile, social order maintained by the collective actions and understandings of strangers (Goffman, 1963; Ocejo & Tonnelat, 2014; Tuvikene et al., 2023), Juliette's account reveals moments where this order is insufficiently upheld. This discrepancy might suggest a need for stronger or more visible forms of social control within public transport environments or perhaps a deeper understanding of how different groups of riders perceive and engage with these social norms (Symes, 2007).

There exists a broader issue within the public transportation system of the city, where the responsibility for passenger safety and intervention in disruptive situations is often seen as outside the scope of drivers' duties: "I have a friend who is actually a bus driver at STIB who says, 'I don't give a damn'. If ever there's a need for a little message, but if someone is being a pain, I say nothing at all. Because in fact, they're scared shitless, well, okay, great. After all, we're all human. It's normal, you know? But well, in the end. That's it, you know? ... Who can we rely on, you know?". Marta's claim regarding the broader issue within the public transportation system,

where the responsibility for passenger safety and intervention in disruptive situations is often perceived as outside the scope of drivers' duties, resonates with the findings from Useche et al.'s (2018) study on the working conditions, job strain, and traffic safety among public transport drivers. Their research reveals that job strain, influenced by high psychological demands and low decision latitude, significantly impacts drivers' performance and safety on the road and highlights the importance of addressing psychosocial factors in the workplace to improve safety outcomes.

Participants' perceptions of security personnel was varied, shedding light on the multifaceted nature of security measures. A notable concern was the non-presence of security staff, with many participants pointing out that security was often absent when most needed, leaving passengers to manage uncomfortable or potentially dangerous situations on their own, as highlighted by Adriana during her interview: "You don't really see people who work for the STIB or people who are there for security. Actually, at least for me, that's the impression I have, you know? Even if something happens in the metro, there's never anyone there immediately to ensure that if there's a fight...you know what I mean?"

While writing in her diary, Marta witnessed an intriguing scene where a man was urinating: "The walk from my work to the metro was fine, but upon arriving at Louise, there was a man peeing at the entrance of the station while a little further away there were guards watching. I warned them but not without making sure he couldn't hear me, he was very drunk.". Later, during her interview, Marta mentioned she hadn't seen the man again, suggesting that the security personnel might have efficiently handled the situation.

Chloé notes during her interview that any kind of personnel quickly reassures her: "Indeed, I quickly feel reassured when I see STIB personnel around, whether it's on the platform or, yeah, at the entrance, at the ticket counter. It's truly comforting to know that someone is there, even if it's not their job to manage public order, let's say, but it's still reassuring to see that... there's someone available in case of need, I would say." She acknowledges that while maintaining public order may not be their primary job, the mere presence of someone available in case of need is reassuring. This sentiment underscores the significant impact that visible staff presence can have on passenger comfort and perceived safety, matching with Stjernborg's (2024) findings, even if their roles are not directly related to security.

Even if a recent survey showed that 66% of the residents want to Encounters with and perceptions of the police force of Brussels tend to be diversified, with participants often expressing mixed feelings. Carolina, for example, had two contrasting experiences with the police. The first experience I would like to present is as follows: "I was chased by a guy who was, I don't know, Colombian or he was Latin American, who spoke Spanish. So he started following me, asking me things. At one point, we argued a bit. I did come across the police. I remember telling them: 'This man is following me' and stuff. And he told them, at that moment, I spoke very little French, and he, in perfect French, claimed he was my boyfriend. And the police said 'oh yeah okay it's a dispute between you guys'. So they said nothing." Carolina later mentioned that the man ended up punching her in the face, and although he was arrested, essentially nothing happened to him: "He hit me, quite hard, actually. So, he was arrested by the police who were nearby. The next day, I went to file a complaint. But it was complicated. The police and stuff, it

led to nothing.” She blames the staff for the aggression she endured because they did not listen to her the first time.

A second and more recent experience that Carolina shared was the following: “After the second time, it’s true that at Meiser I was hit. I had a black eye. Like for three weeks, you know? And so, the police were really nice because it was so obvious that I had, well... There was a mark. So it was... so there were no cameras, but they were still very kind.” This portrayal showcases that the response and effectiveness of the police force in Brussels can vary significantly, impacting the victims’ perception of safety and justice. Carolina’s encounters illustrate a broader issue within the law enforcement system in Belgium: the police force as well as the judicial staff is severely understaffed. The issue of police understaffing in Brussels, coupled with a shortage of personnel in the judicial system, including prosecutors, has been a growing concern, leading to significant challenges in maintaining public safety and order. Reports from various news outlets have highlighted how these shortages are contributing to a range of problems, from escalating drug and gang violence (The Guardian, 2023) to an increased threat of terrorism.

4.5. Security measures

Security measures in public transport systems are crucial for ensuring the safety and well-being of passengers (Cecatto et al., 2022). These measures encompass a wide range of strategies, including the presence of security personnel, which has been previously discussed, the installation of surveillance cameras, entrance gates and the implementation of emergency communication systems. Surveillance cameras serve as both a deterrent to potential offenders and a tool for investigating incidents after they occur. Emergency communication systems, including intercoms and emergency buttons, allow passengers to quickly alert authorities in case of distress. These security measures aim to create a safe and secure environment for all public transport users, reducing the risk of crime and ensuring that passengers feel protected during their journeys (Newton, 2004).

Security cameras in particular, are quite widespread across all forms of public transportation, including trams, metros, and buses. In metro systems, it is observable that the newer the generation of the vehicle, the more cameras are installed, indicating a trend towards increased surveillance. Despite their prevalence and the potential they hold for enhancing security, participants have often expressed doubts about the efficacy of these cameras. Concerns revolve around whether these cameras are actively monitored in real-time to prevent incidents or if they merely serve a post-event investigative purpose. This skepticism underscores a gap between the implementation of security technologies and the public’s perception of their effectiveness in ensuring safety: “They don’t check it. So only if something literally really, really radical happened. Like someone was, was went missing or someone got really hurt or something.” (Juliana, interview). This quote underscore a broader concern among the public about the effectiveness of surveillance cameras in enhancing safety in public transportation. This subjectivity is shared among the wider world population, as demonstrated by Maroun et al.’s recent work (2024). For many individuals, the presence of cameras does not necessarily translate to feeling safer, due to issues with how footage is used, the selectivity of monitoring, and doubts about the

responsiveness of those in charge of surveillance. As Heebels and van Aalst (2020) suggest, these concerns are justified since the monitoring of cameras and its effectiveness can be affected by the group dynamics of the observers, along with their experiences and biases.

Furthermore, many participants expressed that for cameras to be truly effective, there must be transparency about their operation and clear evidence of their impact on reducing crime and enhancing passenger safety. The association of cameras with surveillance and control, however, raises privacy concerns and may make passengers feel monitored rather than protected:

“I am very critical of the surveillance we have today. Because I think it will always exceed the initially intended scope and will benefit a surveillance of the population that will not necessarily aim at pursuing high-ranking criminals, but will rather be like, I don't know, you go to a protest and it was decided that this protest was not authorized. And then, in the end, we will end up being able to follow people who took such and such station and identify them. So, I'm not sure, I try to reassure myself by saying that in Belgium, it's often messed up and that the cameras are not turned on and that nobody is watching.” (Juliette, interview)

Addressing these concerns requires responsible use of surveillance technologies and clear communication with the public about their purpose and protections, transforming perceptions of cameras from instruments of surveillance to tools for safety.

Participants had similar views regarding entrance gates. One could argue that gates and fare control measures serve dual purposes: deterring fare evasion to protect revenue and enhancing the overall security of the transportation network by controlling access (Smith & Clarke, 2000). This dual role underscores the importance of efficient fare control systems in maintaining the integrity and safety of public transport services. However, women expressed concerns that these gates could also contribute to a heightened sense of surveillance and control. The idea that one's movements are being tracked and restricted at entry and exit points adds another layer to the feeling of being constantly monitored (Brands et al. 2013). In Brussels, gates are not necessarily viewed as a security measure: “Gates are the least deterrent thing that exists because there's an emergency button, and voilà! They go right through, they don't care at all. Otherwise, they just jump over. So, it's pointless!” (Marta). Indeed, within the STIB/MIVB network, travelers are not necessarily required to hold a valid ticket or subscription in order to use public transport. Fraudsters can also simply force-entry through a gate that remains open for a fraction of a second after someone else enters. Or, as highlighted by Marta, they simply press the emergency button, which automatically opens up all the gates. This common phenomenon was potentially captured in one of Juliette's diary entries: “We left my friend's place as a group of three, and I preferred to walk a bit further to get to the Porte de Hal station, which I know well and which offers more transportation options than waiting for the tram on Fonsny Avenue. At Porte de Hal, there were several successions of deafening alarms that went off one after the other without us understanding their origin. It was quite annoying without really knowing if these alarms had any specific meaning in terms of security.”

An article by Sträuli et al. (2022), delves into the practices, resistances, and alternatives to controlling public transportation in Brussels. The piece argues that while controls and surveillance aim to reduce fare evasion and ensure safety, they also generate inequalities and reinforce social disparities. The authors suggest that public transport fare evasion and the subsequent controls disproportionately affect younger and financially precarious populations,

limiting their mobility and access to essential services. Participants working in the social aid sector, have generally supported this argument, as exemplified in the following statement made by Viviane: “I mainly think that the gates, represent a division, so to speak, among people living in Brussels, who cannot necessarily afford the subscription because once you're an adult, this subscription is very expensive. So it's a bit, I think, it represents quite a division, somewhat of a class division, in Brussels more than anything else.” She continues on the consequences of this division: “The subscription costs a lot of money, and there are many people who don't pay. And at the same time, I see the other side of it, working in Evere, the number of asylum seekers who get bills, fines that they will never be able to pay or that will take them how many months to pay. It's kind of stupid, right? What's the point of going after money where people already don't have much?”.

The situation changes on other public transport companies, in De Lijn or on SNCB/NMBS, riders are required to have a valid ticket. For instance, on the buses operated by De Lijn, travelers are required to enter through the front door, making fare evasion fairly complicated. This particular diary entry by Juliana, who lives in Flanders and is thus an avid user of De Lijn's network, stood out: “I don't take any measures when I have to take the bus cause is very empty and is safe around my neighborhood but I do take the measures once I get out of the De Lijn.” Although correlation does not imply causation, there could be a link between STIBS/MIVB's network lack of rigor and supervision and De Lijn's more strict approach of who enters in their vehicles. Here's the how the continuation of her trip on her way to Schuman went: “I do feel insecure when I'm in the 95 and I feel uncomfortable cause most of the time I have men standing behind me and close to me. I'm all the time checking if my bag is close and trying to stay in place that I can't have a lot of persons around me.” The experiences of navigating in Brussels's network contrast with individual accounts of commuting in quieter, perceived safer environments on De Lijn, before transitioning to denser, more uncomfortable conditions on STIB/MIVB services. As discussed by Chowdhury & McFarlane (2023), this narrative highlights spatial and social variances in public transport experiences, particularly around personal safety and discomfort due to crowd density.

The presence of panic buttons in metros is a significant safety measure, allowing passengers to directly communicate with the driver in case of emergencies. This feature is particularly crucial in situations where immediate assistance or intervention is required, providing a sense of security to passengers knowing that help is just a button press away. However, the effectiveness of such measures extends beyond their presence, as suggested by Beecroft (2019); it also depends on the responsiveness of the system and the training of the drivers to handle emergency situations efficiently. For the panic button system to truly enhance passenger safety, it must be integrated with an all-encompassing security protocol that includes regular drills, clear communication channels, and rapid response strategies, as argued by Karusala & Kumar (2017). This issue has been echoed in many statements by participants: “Then again, well, about the button. It's true that afterwards, if you talk to the driver, and the driver tells you... or just ignores you, you know? It also depends on the drivers' training. Even if you install the buttons, does the driver have a minimum of... ability to react? To act a certain way, Is he going to ignore it? Is he going to laugh?” (Carolina). This seems to coincide with Latour's Actor Network Theory (2005) which highlights that both technology and humans play crucial roles in any system, including safety measures like CCTV and panic buttons. These technologies depend on human interaction for their

effectiveness, as humans are required to interpret data, respond to alerts, and execute decisions. This interdependency underscores that while technology can enhance safety protocols, it cannot wholly replace the essential human factor. Consequently, effective security systems integrate technological tools with human labor, emphasizing their complementary relationship in maintaining safety.



Fig. 4.2. M1 (1976)



Fig. 4.3. M6 (2007)



Fig. 4.4. M7 (2022)

As demonstrated by comparing figures 4.2, 4.3, and 4.4, the newer the generation of the vehicle, the more visible the panic button becomes, being conveniently located on the right side of each door (STIB/MIVB, 2023).

Some women were not aware, or did not realize that there was a way to communicate with the driver during their ride, as highlighted by Chloé: “I feel like the topic of insecurity is discussed, but we don't really talk about the measures that are put in place, but for example. I had no idea that we could actually contact the driver via a button... yes, that's crazy. Especially since it's true that in a situation, or in case of stress, well where, there's really a danger. It can be useful.” Chloé’s statement reflects a shortfall in communication regarding public transport safety. This lack of dialogue not only leaves passengers ill-informed but also potentially vulnerable, undermining trust in the system's commitment to their safety and well-being. On communication regarding security of passengers, Juliette stated the following during her interview: “Regarding the issue of public transport safety... I believe, sorry but, we are at the absolute zero level of communication on this matter ... And so it gives the impression that if something happens to me, it's really just bad luck, as if it just fell on me and that it never happens. But that's not true.” She further states that communication from STIB/IMVB, when present, can be seen as clumsy and unnecessary: “Even messages like, I think I told you, there was a message 'traffic is disrupted because there was a person on the track', you see? And when you hear that, you get the impression it's an euphemism for someone who threw themselves under a tram. In short, I find that the communication is terrible.”

This collective feedback underscores the urgent need for public transportation authorities to enhance their communication strategies regarding safety measures. By actively informing passengers about available safety features and ensuring that safety messages are clear, relevant, and accessible, authorities can significantly improve passenger confidence and security awareness.

4.6. Modern technologies

This section examines technology's critical role in public transport safety, highlighting advancements like smartphones, apps, AI, and social media. While not directly preventing accidents, these tools excel in rapidly sharing information and alerts. AI's potential in risk detection is noted, but its real-time application is evolving. Social media, meanwhile, proves effective in disseminating information and mobilizing communities, though it emphasizes the dual nature of technology—both beneficial and requiring cautious use. The importance of responsible technology use and discerning engagement with digital content is stressed.

Despite the challenges in researching and implementing technological advancements in the everyday world (Beecroft, 2019), smartphones have emerged as indispensable tools for enhancing security feelings among participants. The first example of this is evident in how the data for this study was gathered. Participants utilized Google Forms to complete their diaries, and this was most likely done using a smartphone. Moreover, versatility of these devices allow users to access a wide range of safety features and information at their fingertips. From emergency calling and location sharing to real-time public transport updates and personal safety apps, smartphones empower women on an everyday-basis with immediate ways to seek help, stay informed, and navigate public spaces more securely. There were many examples on how participants utilized their smartphone to enhance security. Some women regularly have their loved ones on the other line whenever they sense that they have to be on high alert, as outlined by Marta: “In other parts of Brussels, yes, especially in the evening, when coming back from some place. Well then, even actually calling Tony, like my partner...to...you know...to be distracted. But it's not really that, it's that, this way, there's someone else on the other end in case something happens, you know. And then, after all, it's a deterrent because if you're doing something, they're not going to come. They're not going to come and bother you.” When discussing her experiences while living in Brazil, Juliana mentioned that she got accustomed to using a link that would allow her closest ones to know her location: “We have this, um, family link, which your parents get, uh, can track your phone, wherever you are. And if like someone shuts down your phone, it sends an alert to your parents and have that one with my friends too. So it was kind of nice to have that over there” (Juliana).

Indeed, geolocation already brings a great sense of security to public transport users and there are already multiple real-world use cases for this, as argued by Phadatre et al. (2022). Juliana also mentioned the recent update of De Lijn app, which uses real-time tracking to let know on a map where their buses are: “They changed it not long time ago. Before that it didn't work. But right now it's really much precise and then you can see the bus moving. And then you can see the distance between the stop and the bus because sometimes it's like two minutes away, but actually it's not even one minute. So you can track the bus over there and you see them moving and the distance from the stops to the bus and that stuff.”

Juliana further discussed the usage of a device, that she carried with her when living in Brazil: “It's a key chain. Like, um, it's a small thing like that that you it on your chain. Okay. On the, on your phone or in your keys or whatever. And when you press it, it sends an alert, an alert to um, a police station or like the, uh, firefighters also. 'cause they also can help you get through the situation and you'll receive a call saying like, yeah, what's going on, what's happened in that

situation.” Key chains, equipped with safety features like GPS tracking or emergency alert systems, offer a personal layer of security and connectivity.

This digital space serves not only as a platform for expressing empathy towards individuals who have experienced harassment or safety-related incidents but also as a venue for community mobilization and support. Furthermore, the discussions revealed that social media is seen as a valuable tool for offering suggestions and recommendations on safety improvements, including the potential for hosting campaigns aimed at sensitizing the public and enhancing women's security in public spaces. This echoes Casas & Delmelle (2017) study on the potential of Twitter data to understand public perceptions of a Bus Rapid Transit (BRT) system in Cali, Colombia. They argue that traditional public opinion gathering methods, like surveys or focus groups, can be complemented by social media analysis, offering recent, low-cost, and broad-reaching insights. Joanne shared a story during her interview about a type of signage that women use world-wide, which signals distress in case of danger: “There's so many cases that women used this sign and, uh, they try to just, just to dunno to say everyone, to know this kind of sign”. The sign consists of raising up one hand wide open and closing the palm several times. She continues: “There are many videos on social media of situations. Um, there, there was actually one, uh, it was in a car, um, and there was, you know, it was like an avenue, many, many cars. And one of them just saw another one close by. And there was this woman with a guy on her side who was driving, and the woman just was like, uh, very, very close to the window and saw another girl driving. And she was like, like this <opens the palm of her hand and closes it multiple times>. And this woman, fortunately she knew the sign, so they followed this, this car, uh, this car stop in, um, a gas station. And it was in this moment that this woman go out of the car to save her.” Although Joanne has never had to use this sign herself, the fact that this tactic contributed to saving someone's life seemed to reassure her. The personal experiences of harassment shared by participants underscored the significant impact of social media in shaping responses to such incidents. Whether through the sharing of personal stories or the influence of viral content, social media has a profound effect on public perception and individual experiences of safety.

Juliette also mentioned shared several examples on how social media could help spread information and awareness, the following is an extract of an example she gave during her discussion: "There could even be communication campaigns and everything to try to leverage what we can find on social networks and all. But to show that 'ah this thing happened this time and I, the woman, experienced it like this'. But to actually show, behaviors... I mean, to valorize the positive behaviors that there may have been among their personnel and to make them public. And maybe make it a campaign or something like that." Juliette's proposal to leverage social media for public awareness campaigns echoes Loukaitou-Sideris's (2016) insights on women's perceptions and experiences in urban public transport, advocating for gender-sensitive planning and the importance of public perception in enhancing passenger safety. This approach aligns with Casas & Delmelle's (2017) recommendation to use social media analytics as a tool for gathering public perceptions, thereby informing safer and more inclusive public transport systems.

4.7. Summarizing the results

The findings from the study on women's security perceptions using public transport in Brussels reveal critical insights into the dynamics of public transport, security concerns, and the impact of infrastructure and human factors on safety perceptions. Despite efforts to modernize and make the public transport system more sustainable, socio-economic disparities and traffic congestion remain significant challenges. Women's experiences of unsafety, harassment, and the need for vigilance are highlighted, with many taking daily precautions to navigate these challenges. The role of technology, including smartphones, apps, and social media, emerges as a pivotal aspect of enhancing safety, offering tools for real-time communication, information sharing, and community support. The study underscores the multifaceted nature of security in public transport, emphasizing the importance of infrastructure improvements, visible and responsive personnel, and the potential of technology to create safer urban mobility experiences for women.

In the next chapter, the results described above will be translated into a conclusion featuring the answer to the research question described in chapter 2.

5. Discussion and conclusion

This study examined women's security perceptions on Brussels public transport, focusing on their experiences and safety feelings. Although a vast amount of data can already be found on the subject of perception of safety in public transport (i.e. Loukaitou-Sideris, 2016; Stjernborg, 2024; Valentine, 1990), this topic has yet to be explored in the complex social and political context of Brussels. The study highlights the significant role of infrastructure, human factors, and technology in shaping women's feelings of security and how modernization efforts and socio-economic disparities influence the public transport experience. Furthermore, it uncovers the varied nature of safety concerns, including harassment, the need for vigilance, and the impact of technology as a tool for enhancing safety.

To answer the research question, "*How do women perceive security measures in public transport in Brussels?*", data was collected through the distribution of diaries and subsequent interviews with 10 participants. These insights contribute to understanding urban mobility challenges and offer a foundation for improving women's security in public transport settings.

5.1. Women's perceptions of public transport safety

In addressing the primary research question regarding women's perceptions of security measures in (semi-)public transport in Brussels, four pivotal findings emerged from this study.

First and foremost, the study revealed that women often find themselves in a state of constant vigilance regarding their surroundings. The ability to predict environmental conditions, alongside good visibility, the presence of other riders and/or personnel, as well as general cleanliness of their surroundings, emerged as critical factors contributing to their sense of security. Generally, disturbances in these environments are most acutely felt in encounters with individuals who deviate from expected norms and behavioral rules. This finding aligns with Erving Goffman's concept of civil inattention (1963), which suggests a balance between noticing others and keeping a respectful distance in public spaces. In public transport, following these unspoken social norms aids in creating an environment of order and predictability, is essential for women's safety perceptions. However, violations of these norms, such as disorder or harassment, disrupt this balance, heightening women's alertness to potential threats.

Moreover, the shadow of previous terrorist attacks continues to loom over public transport users in Brussels. The memory of such incidents remains vivid in the collective consciousness of the city's residents, further heightening concerns about personal safety and security in public spaces. This threat, unfortunately, persists in the present day. Even though the problem of gang violence is not new (see Vandenbogaerde & Hellemont, 2016), a recent surge in drug-related shootings between gangs have not only exacerbated the existing fears related to terrorism but also introduce a new layer of danger associated with criminal activity and turf wars. The convergence of these factors—the lingering trauma of terrorist attacks and the escalating violence among drug gangs—creates a security landscape in Brussels' public transport system that authorities have been having difficulties in tackling (Carolan, 2024).

Secondly, the critical role of infrastructure in enhancing safety perceptions among women using public transport was also evident. Improvements in lighting, maintenance, and accessibility are not just aesthetic or functional upgrades but are central to fostering a sense of security. This aligns with many studies such as Valentine's (1990) or Loukaitou-Sideris' (2014) which assert that urban planning and design significantly impact women's perceptions of safety in public spaces. The study has also revealed that many participants highlighted the importance of visibility of their surroundings as a key factor in feeling secure. This includes various elements, such as lighting, less vegetation or good transit facilities.

However, one aspect that has received less attention in academic literature is the design of bus and tram stops, specifically of stops that are made out of glass. Glass stops are designed to offer protection from the elements while maintaining visibility, contributing to a heightened sense of safety. Unfortunately, the frequent occurrence of these glass structures being broken presents an unintended consequence. The damage not only detracts from the physical protection and aesthetic appeal of these stops but also significantly undermines passengers' feelings of safety. The prevalence of vandalism or wear leading to broken glass can transform a space meant to convey openness and visibility into a symbol of neglect and insecurity.

Although this is not a new revelation, the significance of having clean public transport environments cannot be overstated, as it plays a pivotal role in shaping passengers' perceptions of safety and comfort (Cecatto et al., 2022; Fan et al., 2016). The challenge of maintaining cleanliness in Brussels' public transport settings has been quite prevalent. Even more importantly, the city is currently grappling with rampant open-air drug-use combined with homelessness. This complex social problem not only presents a challenge in maintaining the physical cleanliness of transit spaces but also contributes significantly to passengers' security concerns. The presence of drug use and homelessness within these environments leads to a heightened sense of vulnerability among passengers.

Thirdly, the reliance on human interaction, particularly with drivers, to enhance safety perceptions underscores the critical role of the human element in public transport security. This finding resonates with the work of Maroun et al. (2024), who illustrate how the presence and visibility of staff, including drivers, significantly impact passengers' feelings of safety. Even more so than surveillance systems and adequate lighting. The emphasis on the presence of personnel as a source of reassurance for women passengers in Brussels' public transport systems sheds light on the foundational role of human interaction in perceived safety. This connection is also supported by the works of Connor & Tewksbury (2012), who explored social control on public buses, emphasizing the importance of visible and proactive personnel in creating a safer environment. Their study underscores the idea that the presence of personnel can significantly reduce incidents of harassment and violence, aligning with the findings of this thesis. Additionally, the study by Kearl (2010) on making public places safe and welcoming for women highlights the critical role of personnel in stopping street harassment and ensuring a sense of security, reinforcing the importance of staff visibility, training, and responsiveness.

Despite the advancements in technology, the human connection and intervention remain irreplaceable in shaping passengers' security perceptions. Moreover, according to this research's results, whenever technology is employed, its ultimate goal is to facilitate human interaction in

one way or another. For instance, to enable communication between a passenger using a device and another individual on the device's other end. This observation underscores a clear understanding of technology's role not as a standalone solution but as a tool that enhances human connectivity in the context of public transport safety. This insight aligns with Valentine's (1990) argument that safety in public spaces, including transport systems, is deeply intertwined with social interactions and the presence of others.

While technology, including surveillance cameras and safety apps, offers new avenues for enhancing passenger safety, the study reveals ambivalence towards its proliferation. This ambivalence reflects a broader societal debate on the balance between security and privacy (Beecroft, 2019), especially within the younger demographics, as highlighted by Ardabili et al. (2023). Thus, a need for transparent and responsible use of surveillance technologies in public spaces is of outmost importance.

Fourthly, there is a notable lack of information about the existing security measures within the public transport system, leading to passengers, especially women, feeling uninformed about what actions to take in case of emergencies. This discovery aligns with the broader discourse on public safety and information dissemination, where studies like those of Loukaitou-Sideris (2016) emphasize the importance of not only implementing safety measures but also ensuring that passengers are well-informed and educated about these measures to enhance their sense of security. The gap in communication underscores a crucial area for improvement, suggesting that greater transparency and proactive dissemination of information could significantly impact passengers' security perceptions. Expanding on this, the role of social media emerges as a vital tool in bridging the information gap. In today's digital age, social media platforms offer unprecedented opportunities for public transport authorities to communicate directly with passengers, providing real-time updates, safety tips, and emergency information.

The utilization of social media not only facilitates a more dynamic and interactive form of communication but also enables authorities to reach a wider audience more effectively. This approach to communication is supported by studies such as Casas & Delmelle (2017) or Georgiadis et al's. (2020), which highlight social media's efficacy in enhancing public safety awareness and engagement. By leveraging social media, transportation companies can transform the way safety information is shared, making it more accessible and engaging for passengers, thereby fostering a culture of safety and vigilance among the commuting public.

To answer the research question, "*How do women perceive security measures in public transport in Brussels?*", it is clear that women's perceptions are significantly influenced by the state of infrastructure, the presence and responsiveness of personnel. While infrastructure improvements and technological advancements hold potential for enhancing safety, the critical role of human interaction and the necessity for clear, accessible communication about security measures are critical in shaping women's feelings of security in Brussels' public transport system.

5.2. Limitations, reflection and conceptual model

Acknowledging the study's limitations, including its focus on Brussels and the qualitative methodology, opens avenues for future research. This research contributes valuable, context-specific insights, reminding us that the pursuit of broader applicability or additional studies serves to complement, not necessarily enhance, the foundational understandings we've established.

The study involved a small, self-selected sample of 10 female participants, which may limit the generalizability of the findings. Although qualitative, and particularly IPA studies, seek depth over breadth, the specific experiences and perceptions captured may not fully represent the broader population of women using public transport in Brussels. The diversity in terms of age, socio-economic status, and cultural background of participants was constrained by the recruitment method, potentially missing out on varied experiences and perceptions of security measures in public transport.

Furthermore, the data collection period may have influenced the findings, since it was conducted during the winter season. This may have inherently influenced feelings of safety due extended times of the day having low-light conditions.

As an avid user of public transport network of Brussels, my own experiences and biases are what inspired me to do the study, which had to be consciously bracketed while performing fieldwork. As a male researcher exploring a topic deeply rooted in women's experiences, there is a certain limitation in fully grasping women's experiences, despite efforts to approach the research with empathy and reflexivity, as outlined in paragraph 3.1. This self-awareness was crucial in ensuring that my perceptions did not influence the collection or interpretation of data. Engaging in reflexive practices, such as keeping a reflexivity journal, allowed me to examine my assumptions and maintain a focus on the participants' perspectives. One example of self-awareness I encountered was recognizing my initial underestimation of the emotional impact that discussing experiences of insecurity on public transport could have on female participants, especially with the participants I initially did not know on a personal level. This realization prompted me to approach interviews with increased sensitivity and adapt my questioning to ensure a respectful and empathetic dialogue. As I embarked on this study, I found myself initially viewing participants' experiences through the lens of my own preconceptions about public transport safety. Recognizing this, I took a step back to reflect on my positionality as a male researcher.

Based on the findings of this study, the initial conceptual model presented in Figure 2.1, which was developed from the literature review, required modification. While the first three principal components remained unchanged, the fourth independent variable "commercialization of public space" was substituted with "staff presence." The research revealed that the roles of drivers, security personnel (and even ticketing office staff to some extent) were crucial in shaping women's perceptions of safety. The prominence of drivers in interview discussions exceeded that of security personnel or police. Participants often expressed reliance on staff intervention in potential situations of concern. Furthermore, the significance of staff is highlighted through their connection with security measures within the Brussels network. Whether concerning panic buttons or surveillance cameras, these systems are yet to operate independently of the human

element. Notably, older women seem to place an even greater emphasis on the importance of human interaction.

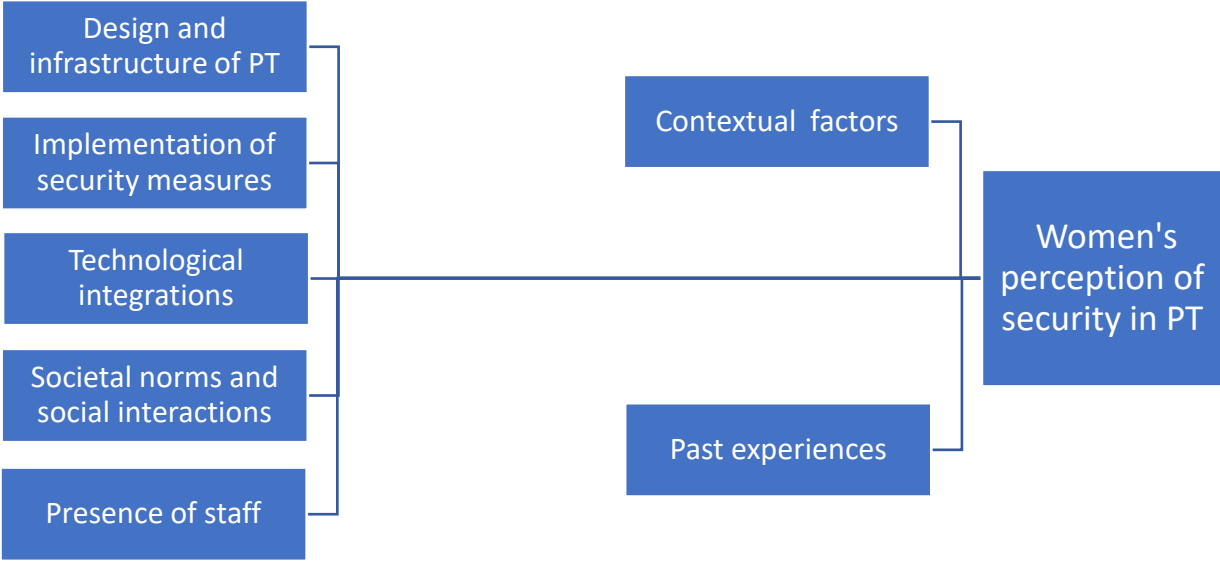


Figure 5.1. Revised conceptual model

5.3. Recommendations for further research

In addressing the aforementioned limitations, the study provides a foundation for future research to explore the subject even further. While Brussels presents a distinctive urban context, its comparison with other cities through comparative urban studies, such as those conducted by Ceccato et al., (2022) are instrumental in identifying best practices and innovative solutions that could be adapted or implemented in other contexts, enhancing global safety strategies.

Further research is also needed to explore the potential of emerging technologies in enhancing public transport safety, especially from the perspective of women. Studies could focus on the effectiveness, acceptance, and privacy concerns related to the use of surveillance technologies, safety apps, and other digital tools the exploration of technological interventions offer a modern dimension to safety strategies, addressing contemporary challenges and opportunities. A field that still remains underutilized is artificial intelligence. The integration of artificial intelligence into the study of urban safety perceptions, as argued by Jevinger et al. (2023), could significantly enhance our understanding and management of urban safety issues. AI technologies, through the analysis of vast amounts of data, can identify patterns and trends in safety perceptions that might not be visible to human analysts. This should not imply that the human factor would become obsolete.

The 'App-Elle' (*translation: appelle = call*) application represents an innovative approach to enhancing women's safety in public spaces, including transportation networks (Chini, 2024). By integrating features such as GPS tracking, emergency calling, and real-time sharing of locations with trusted contacts, the app empowers users to feel more secure during their travels. It also includes a feature that allows users to discreetly alert authorities or emergency contacts with the press of a button, providing a quick response mechanism in situations where women feel threatened or unsafe. There is a pressing need to empirically assess the impact of applications like 'App-Elle' on women's perceived and actual safety. Research in this area could provide valuable insights into the effectiveness of such technologies in deterring harassment and improving security, guiding future developments and policy interventions in urban safety strategies.

Future studies could also explore in greater depth the impact of staff training, visibility, and interaction with passengers on women's safety perceptions. This exploration could encompass how different types of training programs for public transport staff, such as sensitivity training, conflict resolution, emergency response, and gender-awareness training, affect women's perceptions of safety. This research could inform training programs and operational policies aimed at enhancing the role of personnel in ensuring passenger safety, underlining the human aspect of safety measures. Another possibility would be to examine the relationship between the visibility of transport personnel (including drivers, conductors, security staff, and customer service representatives) and passengers' feelings of safety, underlining the human aspect of safety measures.

5.4. Recommendations for transport companies

Drawing from the findings, the study presents specific recommendations for Brussels' public transport authorities, including infrastructural improvements, enhanced staff training, and strategic use of technology. These recommendations are grounded in a comprehensive understanding of the nature of safety perceptions, advocating for a holistic approach to urban transport safety.

Prioritizing training for drivers and other public transport personnel on safety protocols, effective communication, and emergency response is crucial. Increasing the visibility of staff, by hiring more personnel within transit systems, provides passengers with reassurance and a go-to source for assistance, making them feel safer. Some companies, including Keolis France and United Kingdom, have recognized the importance of this issue and have implemented several measures to ensure their staff are well-informed about the safety needs of women (Keolis Newsroom, 2023). In France, these measures include: exploratory walks around the city of Orléans (France) with employees to analyse urban dysfunctions and address women's issues in accessing public space; multiple awareness campaigns such as set up of information stands and communications (Lille and Gironde) on harassment prevention (Gironde); participation in marches against violence (Lille) or the "Ask-for-Angela" system in Besançon.

Advanced technologies, including real-time surveillance cameras and emergency communication systems, as well as artificial intelligence should be integrated in order to facilitate, but not necessarily replacing, human interaction and assistance, aligning with passengers' needs for connectivity and support. This integration should aim to enhance the overall safety network within public transport systems, creating a smooth and responsive safety infrastructure that utilizes technology to amplify, rather than overshadow, the essential human elements of empathy, intervention, and reassurance.

Regular maintenance and prompt repair of infrastructure, such as bus and tram stops, are essential to prevent vandalism and wear. Usage of durable materials and thoughtful design in transit facilities to enhance protection, visibility, and overall passenger safety without compromising aesthetic appeal should be considered.

Furthermore transportation companies should develop comprehensive communication strategies that utilize various platforms (such as social media, mobile apps, websites, digital screens or QR codes) to inform passengers about existing security measures and emergency procedures. Ensuring transparency and proactive engagement can significantly improve passengers' security perceptions and confidence in using public transport. Ensuring transparency and proactive engagement through these methods can significantly enhance not only the security perceptions of female passengers but also the confidence of all users in utilizing public transport.

Additionally, it is important to recognize that many factors and variables influencing public transport safety and security not only depend on the policies at the city level but also extend to federal regulations and even international legislations.

These recommendations for praxis are not solely relevant to STIB/MIVB but may also be pertinent to other public transport operators.

5.5. Conclusion and final thoughts

This thesis delves into the perceptions of safety among women using public transport in Brussels, a city known for its unique socio-political landscape. Through a qualitative study involving diary entries and interviews, it sheds light on the intricate factors influencing these safety perceptions, including the importance of vigilant awareness, infrastructure quality, and the role of human interaction. The research emphasizes that safety in public transport is a multi-dimensional issue, intertwining physical, psychological, and social aspects, with technology playing a supportive, yet complex, role in enhancing security.

The initial hypothesis of this research suggested that daily commuters in Brussels might experience heightened feelings of insecurity, largely influenced by media portrayals of the city's struggles with drug abuse, gang shootings, and homelessness. However, the analysis of travel diaries painted a different picture, indicating that individuals might become habituated to their environments, potentially normalizing aspects of their commute that could be perceived as concerning by outsiders. Despite this normalization, interviews revealed that many women still experience and recall significant safety concerns during their commutes, highlighting ongoing issues. Importantly, this study focused on public transportation users, suggesting a level of security felt by participants; those who feel profoundly insecure might avoid public transport altogether, indicating that engagement with these services does not equate to a complete absence of safety concerns.

Key findings reveal a need for greater awareness and clearer communication about available security measures to improve passengers' sense of safety as well as increased staff training and presence. The study suggests leveraging social media and other communication tools to bridge the information gap and enhance the public's understanding of safety protocols.

Acknowledging its limitations, the thesis opens avenues for future research to further explore this issue through diverse methodologies and broader participant demographics. It advocates for a comprehensive approach to safety that combines effective infrastructure, human presence, and strategic use of technology.

In summary, the thesis calls for collaborative efforts to develop inclusive and effective safety strategies in public transport, particularly for women. By advancing our understanding and implementing targeted improvements, we can work towards making urban mobility systems safer and more welcoming for all passengers, reflecting the evolving needs of cities like Brussels.

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Appendices

I. Travel journal

Travel diary

B *I* U  

By exploring women's security perceptions in public transport, this study utilizes travel diaries for qualitative insights. It highlights the role of infrastructure, technology, and human interaction, and aims to offer recommendations to transport companies for enhanced security and passenger confidence.

Please fill 1 diary page per trip. The same link can be used for multiple trips.

Feel free to ask any questions you may have by whatsapp or by call.

Safe travel!

Fist name *

Short-answer text
.....

Date *

Day, month, year



Time *

Time



⋮

Time *

Time

Which line(s) ? *

Short-answer text

Alone or accompanied ? *

Alone

Accompanied

Purpose of travel *

Work

School

Home

Shopping/Groceries

Other...

Before your trip: Were there any security precautions you took before you left your house? If yes, which ones? Did you feel (un)safe on your way to the stop/station and while waiting for your public transport means? *

Long-answer text

During your trip: Did you feel (un)safe during this trip? Please elaborate as much as possible (why or why not, how, when...) *

Long-answer text

After your trip: How safe did you feel at the stop/station where you arrived and going towards your destination? *

Long-answer text

II. Interview guide

General questions

1. Please tell me a little bit about yourself. (name, age, where you live and work...)
2. Which neighbourhoods do you visit the most in Brussels?
3. How safe do you feel on your day-to-day basis?
4. How safe do you generally feel when using public transport?

Security measures' effectiveness and perception:

5. How do security measures affect how safe you feel when you're using public transport? Do you think that technology plays a role in your sense of security?
6. Do you believe that some security measures are not effective? Or might even be counterproductive?
7. How informed do you feel about the security measures implemented in public transport in Brussels? Were there any security measures that you recently became aware of?
8. From your experiences and perceptions, what recommendations do you have to enhance the effectiveness of security measures in public transport for women passengers?
9. What do you think about the use of surveillance systems such as cameras in public transport?
10. How do you feel about systems that let you track the location of your bus or train? Do you think it contributes to your sense of safety?
11. Do you think that technology (cameras, tracking systems, security apps...) in public transport considers what women need for safety?
12. Are there any technological advancements or safety-related apps that you believe would particularly benefit women passengers in Brussels' public transport?
13. What recommendations would you give to transportation companies to better use technology for enhancing the safety and security of women passengers?

III. Codebook (Interviews)

- Sense of security 43
- Harassment 41
- Drivers 37
- Security measures 37
- Cultural/spatial comparisons 35
- Unsafe 32
- Men 31
- Cameras 29
- Vigilance 29
- Police 28
- Neighbourhood 27
- Society 27 (Merged from Societal and Society)
- Mental health issues 26
- Technology 26
- Bus 25
- Metro station 25
- Lighting 24
- Metro 24
- Lack of information 22
- Suggestions & recommendations 22
- Bus/tram stops 21
- Infrastructure 21
- Surveillance & control 21
- Homelessness 20
- Nighttime 20
- Personnel 20
- Lack of maintenance 19
- Ticket/subscription 19
- Inaction from authorities 18
- Strategies 18
- Drug abuse 17
- Empathy 17
- Women as actors 17
- Incivility 16
- Pickpocketing 16
- Security personnel 16
- Unpredictability 16
- Apps 15
- By-stander/driver inaction 15
- Diasporas 15
- Emergency button 15
- Gates 14
- Past experiences 14
- Crowdedness 13
- Education 13
- Awareness 12

- City center 12
- Communication 12
- Physical & sexual abuse 12
- Transport company 12
- Waiting times 12
- Changes in behaviour 11
- Financing 11
- Precariousness 11
- Terrorist attacks 11
- Politics 10
- Schaerbeek 10
- Taxi/Uber 10
- Controllers 9
- Guiltiness 9
- Training 9
- Walking 9
- Advertisements 8
- Announcements 8
- Anticipation 8
- Bumping 8
- Lack of security 8
- Migrants/Asylum seekers 8
- Nightbus 8
- Relationship 8
- Seat picking 8
- Smartphone 8
- Social media 8
- Stalking 8
- Violence 8
- Authorities 7
- Desertedness 7
- Escalators 7
- Geolocation 7
- Improvement 7
- Lack of communication 7
- Molenbeek 7
- Planning of trip 7
- Temporal comparisons 7
- Train 7
- Tram 7
- Debrouckère 6
- Deterrence 6
- Glass 6
- North Station 6
- Shootings 6
- Catcalling 5
- Linguistic communities in Belgium 5
- Physical aggression 5

- Ribeaucourt 5
- Schuman 5
- Spaciousness 5
- Ticket office 5
- Trivialization of harassment 5
- Tunnel 5
- Visibility 5
- Atmosphere 4
- Ixelles 4
- Midi Station 4
- Reduced mobility 4
- Sidewalks 4
- Works 4
- Autonomy 3
- Elevators 3
- Lack of awareness 3
- 71 2
- Saint-Gilles 2
- Signage 2
- Antwerp 1
- Artificial intelligence 1
- Car usage 1
- Central station 1
- Greenery 1
- Groping 1
- Justice 1
- Loneliness 1
- On-demand stop 1
- Ovest Station 1
- Self-defense 1
- Theory 1