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The Female Perception of Personal Safety on Public Transport in Berlin

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Statement of Originality

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27.06.2021, Trondheim

Date and Place

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Abstract

Sustainable public transport systems are an important tool to create green and healthy cities. To increase public transport ridership and its attractiveness it is crucial that all users feel safe from victimization while using the public transport system. Research has shown that women perceive safety different from men and are more likely to develop avoidance behavior when they experience a reduced feeling of safety which may lead to the avoidance of public transport (Hempel, 2011, Kim, 2019, Crime Concern, 2002, Loukaitou-Sideris and Fink, 2009b).

Understanding what influences the perception of safety and how it does so, can help public transport operators, planners, architects, and other authorities to develop strategies and take measure to increase the overall feeling of safety.

It is therefore the aim of this research to investigate which environmental factors influence the female public transport user's perception of safety in Berlin and discuss to what extent design and planning practices can mitigate the issue by adopting the approaches of Crime Prevention through Environmental Design.

A combination of several complementary methods was chosen to investigate the factors that impact female public transport user's perception of safety in Berlin. These methods are desk-based research of documentation on the topic, an online survey with 106 participants and online interviews with 10 participants. The results and findings were discussed within the framework of Crime Prevention through Environmental Design to analyze how such design principles can mitigate women's perception of safety in the public transport setting.

The results and findings show that the factors influencing female public transport user's perception of safety can be divided into those stemming from the social environment and those stemming from the physical environment, whereas factors from the social environment seem to have a stronger influence. These are especially fellow public transport users whose behavior is unpredictable, e.g. due to intoxication, and the absence of people in the stations. Among the factors of the physical environment it is especially poor visibility and a bad overview of the station layout that contributes to a reduced feeling of safety. It was found that familiarity with a station and the area around it may contribute to a feeling of confidence and comfort among female public transport users. Stations located in areas that have a bad image seem to be avoided more frequently.

The issue of women's perceived safety on public transport in Berlin cannot be solved by physical interventions solely. A holistic approach including the design of the physical environment, but also policy changes and social interventions needs to be adopted.

Foreword

The idea for this research stems from personal experiences of using and being reliant on the public transport systems in Berlin and not always feeling safe while using them. I am very familiar with the feeling of unsafety and how it influences my decisions on what time I should travel home, which stations I might like to avoid and often overly being alert of my surroundings. Conversations with friends and family members have shown that many women share these experiences.

Alongside this, I am interested in the concept of developing green and livable cities where private car usage becomes needless. Yet, how can this be achieved when so many potential public transport users do not feel safe to use public transport at certain times of the day or in certain areas of the cities. Those who can afford it will use a private car or pay for a taxi, those who can't, will limit their travel to times and areas where they don't have to worry about safety. This can create inequality in access to opportunities and use of public facilities among affected persons.

Coming from an Urban Planning background it is of high interest to me that issues like perceived safety are taken into consideration when urban spaces are planned and created. Furthermore, it is important to understand the limits of physical interventions and develop holistic solutions that include physical and social interventions as well as policy measures to create green and healthy cities.

This master's thesis of the two-year program Urban Ecological Planning aims to investigate how a female person's perception of safety is influenced when using public transport facilities in Berlin and to what extent urban planning solutions can mitigate the issue.

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1 Introduction

The initial idea for this research stems from personal experience. Having grown up as a girl and woman in Berlin, and being reliant on public transport for everyday activities, the feeling of unsafety has been a very common experience for me.

During a recent visit to Berlin, I talked with female friends and family about their experiences when traveling with public transport in Berlin. All of them relayed experiences of discomfort, unease and general lack of safety while using the public transport services, and many of them had stories of particularly uncomfortable situations to share. This raised questions of interest, such as why women experience these feelings of unsafety on public transport systems and how the situation could be improved. While the perception of safety is a very complex topic that often depends on an individual's background, external factors that stem from the individual's immediate environment may also influence their feeling of safety. As urban planners we tend to focus on physical urban designs to deal with urban issues, yet especially these kinds of social issues require a holistic approach that understands the urban space as a hybrid of the social and physical environment. This research will investigate which environmental factors influence the female public transport user's perception of safety in Berlin and discuss to what extent design and planning practices can be used to mitigate the issue by adopting the approaches of Crime Prevention through Environmental Design.

As mentioned previously, the research topic was inspired by the lived experiences of other women. One of those experiences is the following:

“I was maybe in my mid-20s and with my bicycle on the S-Bahn in Berlin at night. Then a male passenger got on the train, looking rather threatening in his military-look. He sat down in the seat across mine, legs wide apart. My first instinct was to get out...When the train left the station, he started searching for something in his jacket and I started feeling very uneasy as I thought he would pull a knife. Instead he pulled out a bag of chocolate and offered some to me saying: ‘If you cycle that much, you need to eat something as well!’ I felt very relieved and the chocolate was really good, too!”

This story beautifully illustrates the contradictory nature of female public transport user's experienced fear of victimization and the actual likelihood to become a victim of crime (Kim, 2019, Delbosc and Currie, 2012). Research has shown that women tend to have a greater fear of

crime than men while men are at a greater risk of becoming a victim of crime (Stanko, 1995). At the same time men and women perceive safety differently (Hempel, 2011, Kim, 2019, Crime Concern, 2002, Loukaitou-Sideris and Fink, 2009b). Explanations for this phenomenon range from women being more sensitive to risk because of their greater physical vulnerability, to female individual's perception of vulnerability resulting from susceptibility to sexual assault and frequent experiences of various forms of harassment, to differences in cognitive processing between men and women (Yavuz and Welch, 2010). Women especially fear becoming a victim of a sexual crime which often causes them to avoid certain public spaces that they perceive as unsafe (Stanko, 1995). Public transport is one of these spaces and some studies suggest that fear of crime is the main reason that people choose not to use public transport (Yavuz and Welch, 2010).

The avoidance of public transport trips may have two main impacts, (a) a decrease in ridership and (b) social exclusion of the concerned persons. The decrease in ridership primarily effects the transport company's turnover and possibly their reputation, but also relates to the overarching goal of creating sustainable transportation systems to reduce harmful emissions. The social exclusion of the concerned persons, in this case women, has a direct impact on the user. The Universal Declaration of Human Rights, Article 13 (1) states that "everyone has the right to freedom of movement [...] within the borders of each state" (UN, 2020). This is linked to the concept of safe mobility, that everyone should be able to travel without fear of physical or verbal attack, regardless of their gender, age, ethnicity etc. (Salek de Braun, 2018). If the fear of crime, created by the outside-world, leads to the avoidance of trips on public transport, women's right to freedom of movement is constrained. However, the effects can also be more extensive. The lack of safe and secure transport options can reduce equal economic, educational, and social opportunities for all citizens. Yet with women seeming to be more affected by the issue than men it can increase inequality in opportunity between men and women.

Despite the social exclusion that women can experience because of fear of victimization on public transport, experiencing fear on a regular basis can present a serious health risk as fear generates stress.

The stress theory describes how a person deals with an environment that is perceived as inconvenient (Bell, 2001). Experiencing fear or a feeling of unsafety is one example in which the environment is perceived as dangerous and results in stress. Fear can provoke stress reactions

which include avoidance, reduction or coping with a threatening situation. It can therefore limit a person's activity, disrupt neighborhood cohesion and worsens health (Nasar and Jones, 1997). Crime is seen as a stressor which negatively affects personal safety and well-being. It can have impacts on personal health, economy, family life, social relations, the work and living environment (Bilsky, 2003).

This shows that creating safer urban spaces, including public transport spaces, can contribute to decreasing the level of fear, stress and unsafety, and increase equality in opportunity which will result in healthier cities and reduce inequalities. These outcomes contribute to the continued implementation and eventual achievement of the UN's Sustainable development goals by supporting the SDG 3 on Good Health and Well-being and the SDG 10 on Reduced inequalities.

The relevance of the topic became even more obvious in the light of the recent incident (spring 2021) of a young woman who disappeared on her way home at night in London and was found dead a week later. This created an international outcry on social media addressing the authorities' ignorance on the topic of women's safety. Under the hashtag #textmewhenyougethome, women all over the world started sharing their experiences of feeling unsafe and threatened when being in public spaces, especially at night. Several governments reacted to this by promising to improve women's safety by introducing more and better security measures (Hawley, 2021, Lindved Norup, 2021). Often times these solutions involve increased surveillance based on technology, e.g. CCTV (closed-circuit television). However, Loukaitou-Sideris and Fink (2009b) found that women's safety needs differ from men's and that "the tendency of many transportation agencies to retrofit their station platforms and bus stops with CCTV cameras seems to offer little comfort to women" (Loukaitou-Sideris and Fink, 2009b, p. 559). This shows the importance for local authorities and transport operators to properly investigate the causes of experienced unsafety and develop measures that address female needs precisely.

As mentioned previously, the fear of crime and the resulting feeling of unsafety does not only impact the female public transport user on an individual level, it also leaves its mark on the progress and development of sustainable transportation solutions. Increasing air and noise pollution, especially in bigger cities, draws the focus back to public transport after decades of placing the private car at the center of a city's infrastructure. The motorization of cities has left

its marks on public transport systems. As ridership decreased, services declined, lines were deployed, frequencies reduced, and maintenance neglected (Cahill, 2010). To create attractive and sustainable public transport systems, not only good service but also user's safety needs to be ensured. With women making up at least half of all potential public transport users, and knowing that feelings of unsafety are considered to be one of the main reasons to avoid public transport, increasing female's perception of safety when traveling with public transport is a relevant strategy to increase public transport ridership and decrease private car usage.

In Germany, and particularly in Berlin, public transport is a main mode of transportation for many people. Around 3,5 million passengers use public transport services in Berlin every day (Center Nahverkehr Berlin, 2021), of which more than half are female (Follmer, 2017). While actual crime events are rare and have in fact decreased rather than increased over the past years, public transport users perceive their likelihood of becoming a victim of a crime as higher than the statistics suggest. This gap has becoming bigger over the past years (Bieck, 2013, forsa., 2012). Yet, the perceived safety is relevant for the actual usage of public transport and therefore an important issue to tackle to make public transport more attractive and increase ridership.

The research project SuSi-Plus was a German-wide study on the perception of safety on public transport. They found that bigger cities rate lower in perceived safety which is assumed to be because of higher crime rates and bigger social issues in general. Furthermore, they found that women experience feelings of unsafety more than men, where young study participants reported higher feelings of unsafety. Reasons for feelings of unsafety are individual characteristics, which include a person's background in terms of age, ethnicity, income, education, beliefs, etc. as well as strength, speed, and abilities in self-defense, and external factors that relate to a person's environment. These factors can be darkness, strangers, low busyness of an area, and neglect of an area (Hempel, 2011).

Plan International also conducted a survey that asked girls and women in four big cities in Germany (Berlin, Hamburg, Cologne and Munich) about their perception of safety in different places in the city. Public transport ranked second, after streets, where girls and women feel unsafe (Plan e.V., 2020).

Although some research has been done in Germany on the perception of safety, public transport operators criticize the lack of available data on crime and fear of crime among public transport

users and request a nationwide report on the safety on public transport among other things (Bieck, 2013).

The absence of such data shows how little attention is given to the topic on an institutional level while public transport operators recognize the importance of it to make public transport more attractive.

This thesis makes a first attempt to investigate the female public transport user's perception of safety in Berlin by focusing on the external factors that might influence a woman's feeling of safety. These factors are further called environmental factors as they stem from the environment a person is moving in. It further discusses the applicability of interventions within the framework of Crime Prevention through Environmental design. This research aims to answer the following questions:

1. How does the environment influence the female public transport user's perception of safety in Berlin?
 - 1.1. What are specific environmental factors that act as fear arousing?
2. Does the framework 'Crime Prevention through Environmental Design' offer interventions to mitigate a female public transport user's feelings of unsafety?

In the following chapters a Theoretical Framework will be presented which defines and outlines the most important concepts the research is based on. These concepts also helped to define further steps of the research and provide a framework for discussing the results at the end of this thesis.

The methods that were used for this research are desk-based research, an online-survey, and online interviews. A precise description of the choice of methods and their implementation will be given in the Methodology.

A short Context chapter will introduce Berlin, it's public transport service, and challenges that exist in connection with the female public transport user's perception of safety.

The Results and Findings from the survey and interview responses will be presented and subsequently discussed with reference to the theoretical framework.

Limitations of the research, recommendations for future research and a conclusion will be presented at the end of the thesis.

2 Theoretical framework

This chapter presents the different theories that were used to develop a comprehensive understanding of the perception of safety and how an individual's environment can influence this perception. The theories introduce important aspects that are needed to be considered in the further development of the research and provide a systematic guidance on the existing knowledge relevant to this topic. These included the focus of the research, the study sample, as well as the development of interview and survey questions. The theories will be discussed in connection with the findings in the last chapter of this thesis.

2.1 Safety

Safety is defined as the “condition of being safe from undergoing or causing hurt, injury, or loss” (Merriam-Webster, 2021). Hurt, injury, or loss can have different causes of which two are relevant to the public transport system. The first cause is errors in the operational system itself which can result in accidents like derailing of the vehicle or collision with another vehicle. The second cause is unlawful behavior of fellow users of the public transport facilities. This behavior includes harassment, robbery, assaults etc., which are commonly defined as crimes. This research focuses on the second cause and therefore on being safe from victimization through crime.

The terms safety and security are often used interchangeably in every-day language, yet the concepts behind them are not identical but complement each other. While security is the protection of individuals, organizations, or properties against external threats that can cause harm, safety is the feeling of being protected from the factors that cause harm. An individual who feels in control over their risk causing factors also has the feeling of being safe (Safety, 2020). Furthermore, the feeling of being safe is an emotional aspect while security deals with physical aspects. In the case of this research topic ‘The female perception of personal safety on public transport’ it is investigated whether the person feels safe from factors that cause harm by either having control over these factors or that sufficient security measures are in place to protect the person from external threats. In the public transport system these security measures can include security personnel, CCTV surveillance, barriers, or access control to stations, among others. If a feeling of safety cannot be established the person can experience feelings of unsafety to the degree of fear. The following section further explains how fear arises in the first place, how a person might cope with this feeling, and its impact on behavioral decisions.

2.1.1 Fear arousal and coping strategies

Understanding how and why a person may experience a reduced sense of safety is the root of the issue. Whether a situation is fear arousing or not depends on the individual's personality.

Fear, as an emotional state, is triggered by the perception of a threatening stimuli (Ruiter et al., 2001), which can be another person, a dark street, or even an image or a piece of text. A perceived threat is always necessary for fear arousal, yet it does not always result in it. A person who experiences fear will then engage in some sort of self-protective action, which Ruiter et al. (2001) points out is either fear control or danger control. The first is an emotion-focused coping process, while the latter is oriented towards the presented threat. Public transport passengers who don't feel safe may engage in fear control or danger control through coping processes and avoidance behavior (Chowdhury and van Wee, 2020, d'Arbois de Jubainville and Vanier, 2017). Avoidance behavior includes a range of strategies to avoid a certain situation that may be fear arousing. These strategies include taking a detour, using an alternative mode of transportation, or avoiding travel all together (d'Arbois de Jubainville and Vanier, 2017). If a person's coping process is emotion-focused they are likely to stay in the threatening situation, e.g. waiting at a train station that they perceive as unsafe but adopt a behavior to deal with their emotional state. This could be for example listening to music, reading a book, or talking to a friend on the phone, to distract their mind and suppress their emotions connected to fear. If their coping process is avoidance behavior then it is oriented towards the presented threat, e.g. the train station that is perceived as unsafe, and passengers are likely to avoid that situation by leaving the station. However, public transport users have the primary goal to travel from one place to another which makes them more likely to engage in fear control rather than danger control when presented with a threatening situation. If a threatening situation is known beforehand, for example by knowing that a certain station is perceived as unsafe, users are more likely to avoid that situation by taking a different route. How these behavioral decisions are made can be explained with the theory of planned behavior.

Theory of planned behavior

The theory of planned behavior is used in many fields to predict intentions to perform behaviors of different kinds. Attitudes, subjective norms and perceived behavioral control influence specific actions in specific situation (Ajzen, 1991). These components are determined by beliefs and evaluations of the beliefs. Behavioral beliefs shape attitudes, normative beliefs influence

subjective norms and control beliefs determine the perceived behavioral control (Heath and Gifford, 2002). A behavioral belief is the subjective probability that the behavior will produce a given outcome or experience. Normative beliefs are shaped by the perceived behavioral expectations of referent individuals or groups. These can include friends and family but also teachers, supervisors or co-workers (Ajzen, 2019). Perceived behavioral control refers to a person's perception of the ease or difficulty to perform an intended behavior. Furthermore, it relates to the concept of self-efficacy which defines how well one believes to be able to carry out actions to deal with a prospective situation. Self-efficacy beliefs can influence choice of activities, thought patterns and emotional responses (Ajzen, 1991). Figure 1, shows how a behavior is formed, based on these different beliefs.

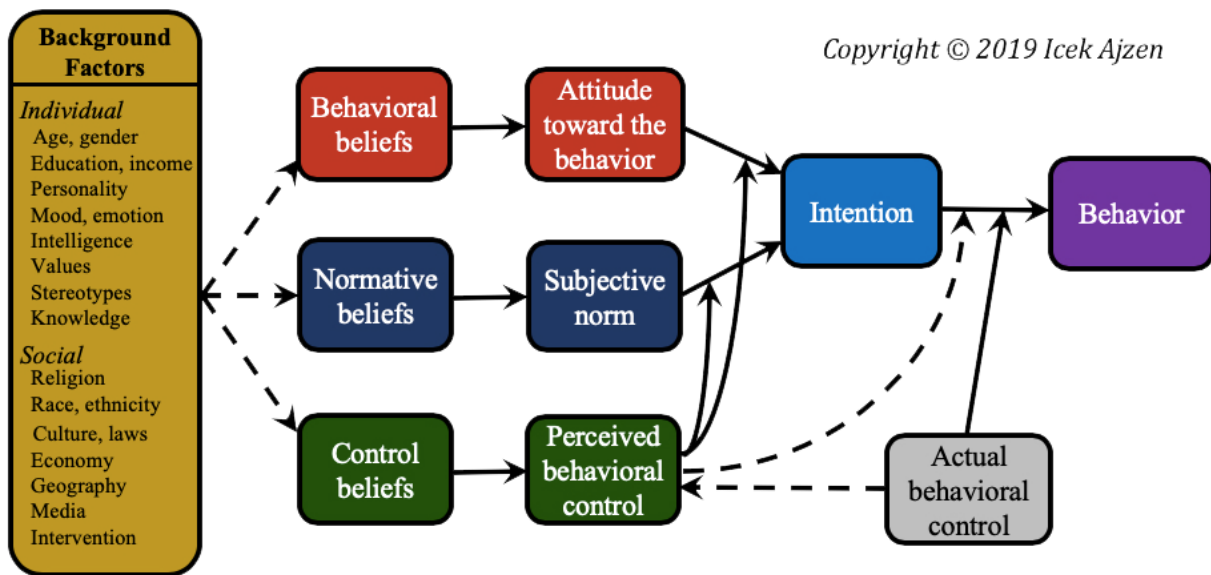


Figure 1 Ajzen's Theory of planned behavior (Ajzen, 2019)

Ajzen's theory suggests that a public transport user's behavior in relation to experienced unsafety can be explained with the theory or planned behavior. This can best be demonstrated by applying the theory of planned behavior to a public transport user before and after encountering a threatening situation. A public transport user who feels generally safe and hasn't experienced any threatening situations believes that he/she can reach a certain location by traveling by public transport on a specific route (behavioral belief), his/her normative belief might be that public transport is more environmentally friendly, and he/she believes that the behavior is under control, so the trip will be carried out. A public transport user who has experienced a threatening

situation might still believe that using public transport can bring them to their desired location, and that it is more environmentally friendly, but their perception of behavioral control has changed. The user might therefore decide to avoid the situation that decreases their control beliefs by taking a detour or a different mode of transport. Ajzen (1991) points out that the different beliefs, including control beliefs, are shaped by background factors that stem from the individual background or the social background. These individual factors include age, gender, education, personality, and knowledge, among others. This suggests the complexity of the behavior forming and that generalization might be difficult. Investigating how certain factors of the environment influence the female public transport user's control beliefs, will therefore never be fully detached from the user's personality which needs to be considered when the collected data is analyzed.

2.1.2 Perception of safety

The Oxford Learner's Dictionary defines perception as "an idea, a belief or an image you have as a result of how you see or understand something" or "the way you notice things, especially with the senses"(Oxford Learner's Dictionary, 2020). In philosophy and psychology perception is "the process of attaining awareness or understanding of sensory information" (OU, 2017, p. 18). The definitions already imply that perception is a diverse matter that strongly depends on an individual's social and cultural background as well as personal experiences. In order to make sense of our environment we interpret the information we perceive. The interpretation of a situation is very subjective and depends on several demographic, social and cultural factors. A hug or kiss, for example, is a common greeting in many western countries, while in other countries it is considered as sexual behavior (OU, 2017).

Since perception itself is very subjective and depends on a range of factors, the perception of how safe a person feels in a public space is also dependent on a person's individual background.

The perception to not be safe from victimization of crime, differs from actual crime statistics, which are often lower than people perceive them (Crime Concern, 2002, Bieck, 2013). Yet, the perception of safety is decisive for people's behavior and therefore whether they feel comfortable using public transport or not. How an individual perceives a certain place or situation depends on a number of environmental and personal factors. The complexity of this phenomenon has been subject to several research topics and many concepts and theories have

been developed to explain how and why the environment can contribute to a fear of crime. Some of these are explained briefly in the following sections. The importance our physical environment plays on the perception of safety and well-being has been widely recognized and embedded into the concept of Crime Prevention Through Environmental Design (CPTED) which is nowadays used as a guideline by architects, planners, local and national governments, and international organizations to decrease crime rates and fear of crime and increase quality of life. CPTED is further explained at the end of this section.

2.2 Gender and Age

As the previous section outlined, fear arousal, behavioral choices, and perception of safety depend on an individual's personality and background. The two factors that are commonly investigated, and that show significant differences in the perception of safety and the public transport travel behavior, are a person's age and gender.

People of different genders have different perceptions of their personal safety while using public transport. Braungart et al. (1980) found that women report a fear of crime more often compared to men at each age level. Since women are generally more concerned about being victimized it impacts their travel behavior to a point where trips are avoided completely (Ouali et al., 2020, d'Arbois de Jubainville and Vanier, 2017). In addition to the feeling of personal safety, the travel behavior of men and women differs as well. Women are more reliant on public transport as an affordable mode of transportation as their income is on average 20% less than that of men, hence women take the bigger share among passengers on public transport (Chowdhury and van Wee, 2020). Although a study conducted in Scotland found that men and women undertake a similar number of trips, the purpose of their travel differs. While men report they use public transport to reach pubs, clubs or sporting events, women often escort family members and run household errands. Trips performed by women tend to be more complex as they combine multiple demands or purposes and travel outside peak-hours more often (Hine and Mitchell, 2003). Since female public transport users are more likely to feel unsafe, have less opportunity to change their mode of transportation and suffer bigger social consequences when their mobility is limited, creating a public transport system that women perceive as safe is likely to be perceived safe by everyone and it supports equal opportunities for all citizens.

Differences in age also mean differences in cognitive and physical development or abilities. Children and older people are more vulnerable to attacks as they have less physical strength to defend themselves. While minors are usually accompanied by a parent or other caretaker, older people tend to travel by themselves. In addition to the fear of crime, especially after dark, older people often feel uncomfortable sharing public transport with groups of school children due to their bad behavior and foul language (Cahill, 2010). Although elderly women might feel more unsafe when using public transport, the research focuses on women aged 18 to 50, as they are more likely to have similar travel behavior, e.g. commuting back and forth to work or university, going out at night, or visiting friends.

2.3 The relationship between public spaces and the feeling of unsafety

The main aim of this research is to investigate how a female person's environment can influence her perception of safety. This is important since the environment can be changed through design interventions, policies, and regulations, while a public transport user's personality cannot be changed towards being less fearful. The following theories draw connection between the individual and the space surrounding them.

2.3.1 Prospect refuge theory

A person has control over his or her environment when events and conditions of the environment can be overseen. The Prospect-Refuge theory assumes that people feel safe in spaces which are open (prospect) and offer possibilities to seek help or hide at the same time (refuge). Spaces that are clear and easy to understand make it possible to detect threats early so that one can prepare for a potential attack. An empirical research undertaken by Loewen et al. (1993) shows that some of the most important factors to influence perceived safety are lighting, the degree to which a space is open and the accessibility of secure areas.

The physical public transport environment consists of various spaces and elements which according to the prospect-refuge theory are perceived as more or less safe depending on factors like lighting, openness, and refuge. The following images ([Figure 2](#), [Figure 3](#), [Figure 4](#)) show examples of built environments that are more likely to create feelings of unsafety due to lack of transparency and clearance. Dark corners and a lack of overview of the platform caused by massive pillars or temporary constructions offer opportunities for hidden threats which leave public transport users with a sense of loss of control. Especially in underground train stations that require artificial lighting it is likely that not all station areas are lit to the same degree and

designing underground stations that fulfill the user's need for light and openness in order to feel safe can be a challenge for planners and architects. This research will therefore investigate to what degree these spatial factors influence the female user's perception of safety.

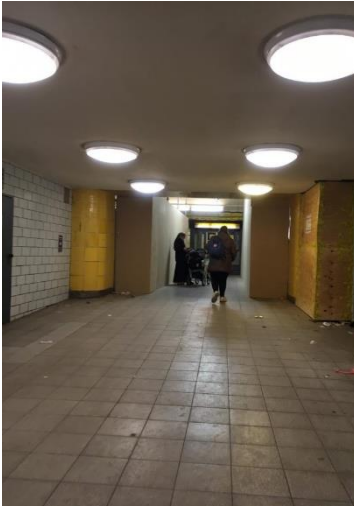


Figure 2 Pedestrian underpass at U Hermannplatz, Source: own image

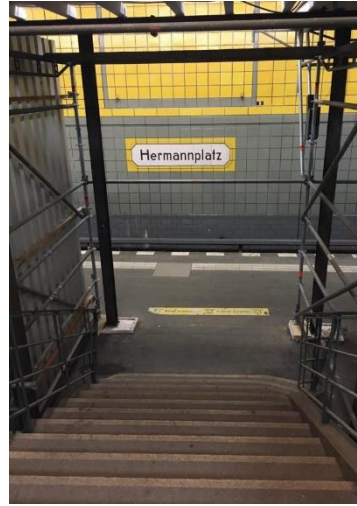


Figure 3 Temporary construction at U Hermannplatz, Source: own image



Figure 4 Massive pillars blocking clear view of the station at U Residenzstraße (Fiedler, 2018)

2.3.2 Disorder Theory

The Disorder theory assumes that feelings of unsafety are caused by social disorganization processes which are manifested in “incivilities”. “Incivilities” are conditions or behaviors in public spaces that signal an instable condition of the space or area. They send the message that general rules and norms of society do not apply to this space which can be perceived as a sign that public order is disturbed. This disruption of public order results in a fear of crime. At a neighborhood level, correlation can be seen between actual incivilities and actual reported crime rates (Taylor and Shumaker, 1990). Incivilities can be of social or physical nature. Social incivility refers to “untended people and behavior” and physical incivility refers to “untended property”. Some literature suggests that social incivilities are more fear provoking than physical incivilities (LaGrange et al., 1992). Persons whose behavior doesn't seem to fit into a functional society or public order are perceived as unpredictable and therefore threatening.

Examples for incivilities are:

- Closed public institutions
- Loiterer
- Addicts
- Empty and neglected buildings
- Dirt / trash
- Drunk people
- Graffiti
- Vandalism

Public transport stations and vehicles are often scenes for physical incivilities like tagging, graffiti, and willful damage. Especially during wintertime, stations also act as meeting space for groups of people that seem to be homeless and/or addicts. Public drinking is legal in Berlin which adds the component of alcohol consumption and therefore drunkenness at public transport stations and on public transport vehicles. Public transport operators like the BVG started reacting to the issue by prohibiting the consumption of alcohol on their trains and buses. However, drunkenness and consumption of other drugs can still be found in and around public transport facilities. This study will investigate the influence of social and physical incivilities that are likely to be experienced when using public transport. The physical incivilities investigated are graffiti, cleanliness, and vandalism, and the social incivilities investigated are addicts and drunk people, who are summarized under individuals/groups whose behavior seem unpredictable.

2.3.3 Eyes on the street

The term ‘eyes on the street’ was coined by Jane Jacobs in 1961 with the publishing of her book *The Death and Life of Great American Cities* (Wekerle, 2000). The basic concept behind the term is that more eyes on the street make the city safer. These eyes belong to stores and public places, street vendors and pedestrians. To increase safety she recommended to include stores and workshops into buildings to encourage more street activity (Wekerle, 2000). Jacobs observed that only a few incidents of crime can discourage residents from using a certain space and make it feel more unsafe. Therefore, extended residential and commercial activity that leads to higher street activity is associated with reduced crime risks (Cozens and Hillier, 2012). The concept of ‘eyes on the street’ influenced other theories like the Defensible space theory and Crime prevention through environmental design.

‘Eyes on the street’ can be applied to public transport facilities as well. Bigger stations often host shopping facilities and small food places, while smaller stations tend to have a bakery or kiosk in

the entrance area. However, these facilities are concentrated around the entrance area of the station but are rarely found on the platforms where users wait for the train. Based on the ‘eyes on the street’ concept this study investigated the influence of the presence or absence of other passengers while waiting at the platform.

2.4 Crime prevention through environmental design (CPTED)

The framework of Crime Prevention Through Environmental Design was developed by C. Ray Jeffrey in 1971. This built on the work of Jane Jacobs who criticized segregatory design policies that destroy established community fabrics and built-in safety structures (Svensdotter and Guaralda, 2018). Jeffery (1971) points out that criminal behavior is a product of environmental conditions and can therefore be addressed through urban planning and design, social planning, systems analysis and decision theory, and governmental policies. The concept was further developed and popularized by Newman who noted a deterioration of safety when residents experience lack of control over their environment and as a result feel less responsible for their neighborhood (Svensdotter and Guaralda, 2018). This led to the development of the Defensible Space Theory which states that public and semi-public spaces designed in a way that residents feel a sense of ownership and responsibility towards it, are defended against hostile intruders through the organizational patterns developed by the primary users of the space (Ostrom, 1975). The defensible space theory is applicable where a relatively small community can be identified as the primary user, however, where a public space is undifferentiated and a large number of people use that space it becomes a “no-man’s land” where everyone is relatively “free” to use it for lawful or unlawful purposes (Ostrom, 1975). Public transport stations in a big city like Berlin can rarely be attributed to a small community and are generally used by a large number of people. Although community ownership of a public transport station is difficult to achieve, certain elements of CPTED design principles can be implemented in public transport systems. In general CPTED focuses on the topics Territoriality, Surveillance, Access Control, Target Hardening, Activity Support, and Image Management (Cozens and Van der Linde, 2015). These six topics are explained briefly below and illustrated in [Figure 5](#).

Territoriality: refers to designing a public space in a way that users and residents develop a sense of ownership and responsibility for the space and are more likely to act as guardians.

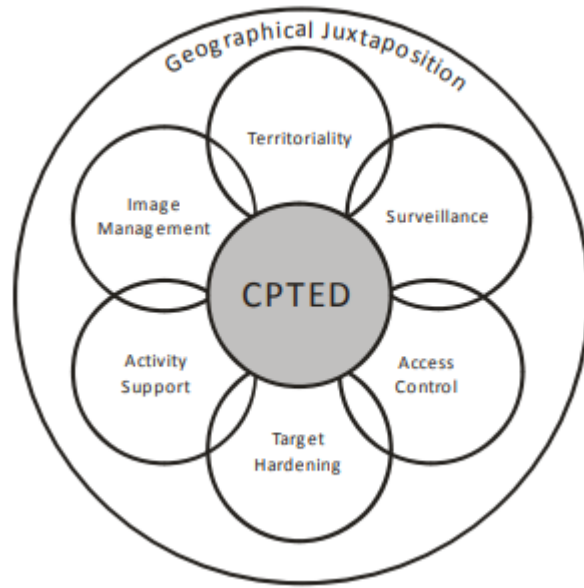


Figure 5 The six components of CPTED (Cozens and Van der Linde, 2015)

Surveillance: is about enhancing visibility as most potential criminals or offender do not want to be noticed. Surveillance can be carried out through CCTV or other technologies as well as by security personnel. Natural surveillance is a form of indirect surveillance through street-level shops, windows and entrances facing the street, to give residents and visitors of the area the opportunity to observe what is happening on the street (Cozens and Love, 2015). Jane Jacobs (1961) referred to this strategy as ‘eyes on the street’.

Access Control: helps to define public and private space and controls who is able to enter a specific site or building. Means of access control can be card entry systems, bollards, fences etc.

Target Hardening: focuses on minimizing opportunities to engage in unlawful activity at the scale of the building by using for example stronger doors and windows, more efficient locks, alarms etc.

Activity Support: aims at attracting safe and legitimate activities to an area that is perceived as unsafe. Higher activity in a space and thus more ‘eyes on the streets’ potentially lowers crime rates as offenders are more likely to be seen.

Image Management: is about maintaining an environment in a way that it looks cared for and supervised. This can create a feeling of safety and deter criminals. Examples include the removal of graffiti and prompt repair of vandalism.

CPTED guidelines are nowadays implemented at train stations across the world to increase user's safety. However, a small study conducted in Perth, Australia, compared two train stations in terms of user's perception of safety of which one was designed according to CPTED principles and the other one wasn't. Interestingly enough, survey respondents found the station that wasn't designed according to CPTED to be safer. This suggests that the effectiveness of CPTED is influenced by the local environment surrounding each station and its image (Cozens and Van der Linde, 2015). The effectiveness of CPTED had been subject to a vast number of studies but it is yet not possible to draw a generalized conclusion on whether CPTED reduces crime, the fear of crime, or increases quality of life. Some studies have shown that crime rates dropped after the introduction of CPTED to the area but the methods that were used don't allow to empirically prove the effectiveness of CPTED (Cozens and Love, 2015). A second generation CPTED which was developed in the late 1990s focuses on social and economic factors and conditions that can reduce the efficacy of CPTED strategies (Cozens and Love, 2015). Notably, the study carried out in Perth, Australia, raised the question of the influence of the image of an area for public transport users in Berlin and the factor was therefore added to the investigation. The CPTED design principles offer a framework to juxtapose the findings of this research and discuss the scope and impact of the CPTED design to address the female public transport user's perception of safety.

2.5 Factors related to the use of public transport

In addition to our immediate physical and social environment (the design and layout of a public space, people surrounding us) some more general factors also influence how safe a person feels. The time of the day has been found to be of great importance as public transport users tend to feel more unsafe after dark (Hine and Mitchell, 2003, Delbosc and Currie, 2012, Hempel, 2011). Certain stations and areas might be avoided at night but feel safe enough to travel through during the day. The location of the station further impacts the perception of safety. As research on CPTED-designed stations suggests, does the local environment of a station and its image influence the feeling of safety (Cozens and Van der Linde, 2015). Some areas of a city hold the

image of being unsafe, which might be supported by hear-say, media attention and unfamiliarity with the area.

Public transport users perceive safety differently depending on the mode of public transport they are using. Buses are generally perceived as safer since a staff member (the bus driver) is always on board and in reach for help (Delbosc and Currie, 2012). A passenger survey conducted by the BVG– Berliner Verkehrsbetriebe (Berlin Transport operator) found that users rate their feeling of safety better for buses and trams compared to the underground trains (Berliner Verkehrsbetriebe, 2019).

2.6 Summary

The theories presented in this chapter inform the investigated problem of the influence of the environment on the female's perception of safety as well as the different stages of the study. First, it was important to gain background knowledge to determine what safety constitutes of and how perceived safety differs from actual safety, i.e. the likelihood to become a victim of crime. A perceived lack of safety can result in feelings of fear which have a significant influence on a person's behavior. The theory of planned behavior outlined the different beliefs that influence whether a behavioral action will be carried out or not. It also points out the importance and influence of the individuals background on these beliefs. This information led to the attempt of eliminating different individual backgrounds from the study sample as much as possible and needs to be kept in mind when analyzing the data and discussing the findings.

Figure 6 summarizes the theories presented in this chapter and illustrated how they interact with the research at different stages.

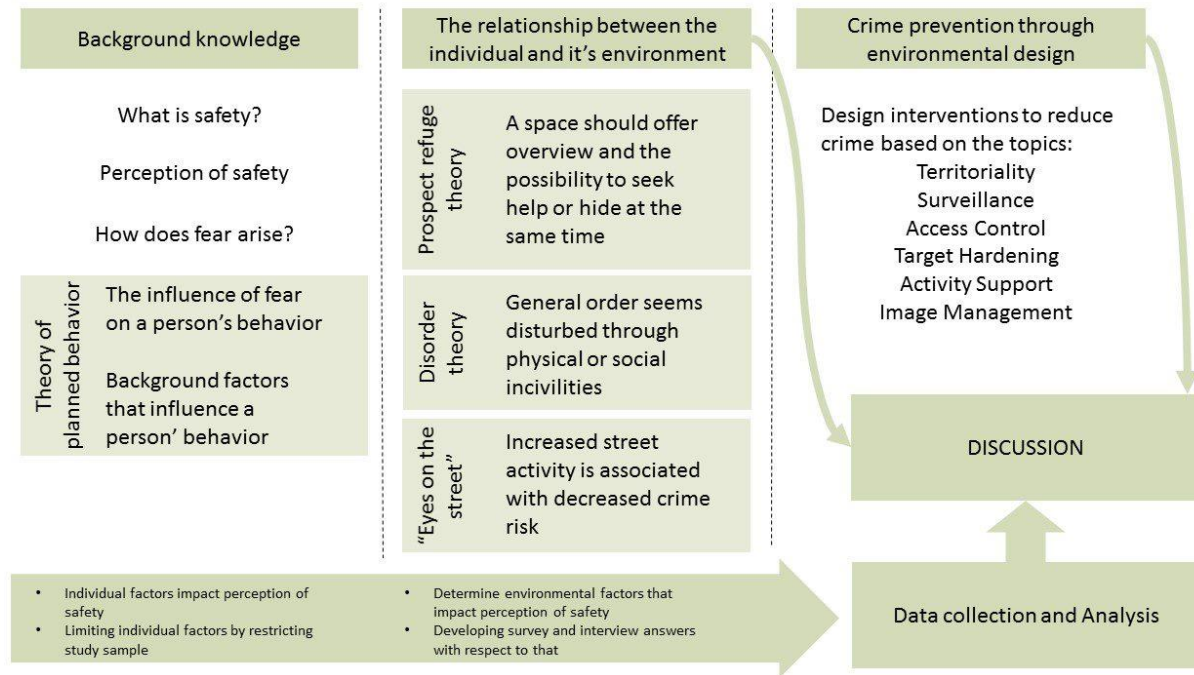


Figure 6 Summary of theories and interaction with different research stages

After developing this background information, the relationship between the individual and their environment with respect to perceived safety was investigated. The concepts and theories of this section helped to determine the focus of the study and the questions that were asked. They will be discussed in connection with the findings in the last chapter of this thesis

The prospect refuge theory explains how different spatial designs are perceived as safe or threatening and what kind of features a space should provide for the individual to feel safe. This is providing overview of the surrounding while offering possibilities to seek help or hide at the same time. Therefore, an open and well-lit space is perceived as safer than a narrow, dark passage. The disorder theory relates to public spaces whose general order seems to be disturbed. A disturbed general order can raise the assumption among users of the space that rules and laws aren't followed in this space and that it therefore is unsafe. The factors that contribute to the disturbance of the general order are called incivilities and can be divided into social and physical incivilities. These incivilities are for example drunk people, addicts, loiterers, trash/garbage on the ground, graffiti, and vandalism.

Eyes on the street is a concept that associates increased street activity with decreased crime risk. This also means that users of spaces with a high activity feel less at risk to become a victim of crime and therefore safer.

Crime prevention through environmental design is a concept based on design-intervention to reduce crime. Its main argument is that crime happens in places that give potential criminals the opportunity to carry out a crime and that therefore, crime is a product of environmental design. In general, CPTED focuses on the topics Territoriality, Surveillance, Access Control, Target Hardening, Activity Support, and Image Management. The CPTED provides a framework to juxtapose the findings of this research and discuss the scope and impact of the CPTED design to address the female public transport user's perception of safety.

In addition to the relationship between the individual and the space surrounding it, some other factors that relate to the use of public transport were recognized by reviewing existing literature. These include the time of day, as users are more likely to feel unsafe after dark, the location of a station, and the mode of transport that is used.

3 Methodology

In this chapter, the methods that were used to collect data are described. First, the setting of the research is presented, followed by a description of the data collection and data analysis.

Challenges and limitations that were met during the research process and how they were dealt with are outlined at the end of this section, followed by the ethical considerations. In addition to a desk-based research of documentation, the data was collected through an online survey and online interviews. Quantitative and qualitative methods were used to analyze the data, with thematic coding being the main method.

A combination of several methods was chosen, as they are highly complementary. None of the sources has a complete advantage and can provide a comprehensive understanding of the issue by itself.

A desk-based research of documentation that is relevant to the problem of the female's perception of safety on public transport in Berlin was important to gain a certain knowledge base and information relevant to the case. This knowledge base helped to set a focus for the study and define the sample group and further methods.

A survey was chosen to collect a large amount of data that is easy to analyze. Especially, after being restricted to a remote data-collection due to the ongoing Covid-19 pandemic, a survey was the best way to reach out to a large number of participants. In addition to the survey, short online interviews were held with female public transport users in Berlin to gain a better understanding on the issue of women's safety on public transport.

Interviews allow explanations and experiences of participants to be expressed thoroughly and for the interviewer to ask follow-up questions. This kind of information cannot be gained through a survey solely.

3.1 Setting of the research

The idea to study women's safety in public spaces stems from the researcher's personal experience of having grown up in Berlin and having dealt with feelings of unsafety in public spaces, including public transport, on a regular basis. Conversations with friends and strangers led to the impression that this is a topic that impacts many people and especially women. The initial idea was to investigate what factors in general contribute to a feeling of unsafety, including individual characteristics as well as environmental, or external, factors. Yet, not long

into the literature review it became clear that the topic of experiencing fear and unsafety is extremely broad and complex. It was therefore decided to focus on the environmental factors as they are more likely to be addressed in urban planning or policy solutions than a person's individual characteristics. These environmental factors can stem from our physical or social environment, and include for example the design of a station, the lighting, and the cleanliness, but also the absence or presence of other users of the public transport facility or their behavior (LaGrange et al., 1992, Cozens and Hillier, 2012). Public transport is a very special form of public space as it is often shared with others by necessity. This necessity is created by the dependency on public transport to be mobile within the city.

Berlin was chosen for this research because of its intensive public transport network including over- and underground trains, busses and trams. Furthermore, Berlin is a very diverse city with people from different social and ethnical backgrounds, as well as city districts with different stigmas and cliches. The researcher's familiarity with the city and its public transport network was another advantage.

The perspectives and opinions of female public transport users in Berlin was explored to understand how the physical and social environment impacts their perception of personal safety and what specific factors contribute to the feeling of unsafety.

3.2 Data Collection

The data was collected through an online survey and ten online interviews. Initially the interviews were meant to be in-person with more women who are not known to the researcher and whom the researcher could have approached while they are waiting at train stations or using the train. Yet, due to the ongoing Covid-19 pandemic all data collection was done remotely, meaning that the researcher was based in Norway while collecting data from women based in Berlin.

Desk-based research

To better understand the overall issue of personal safety on public transport in Berlin, a desk-based research was carried out to search and analyze relevant documents. These included mainly statistics, e.g. mobility in Berlin, crime rates etc., user-satisfaction-surveys conducted by public transport operators, news reports and social media entries. In addition, policies and measures that

address the issue of personal safety and reports from institutions connected to public transport were reviewed as well.

At first academic databases like google scholar and oria were searched for literature and research using the search term 'Berlin' in combination with 'public transport', 'safety', 'safety on public transport', 'crime', 'fear of crime'; 'demographic changes', among others. Yet, apart from the research project SUSI Plus, no relevant academic literature was found that investigated the specific issue on female public transport user's perception of safety in Berlin or contributed useful information and data from a German context. Official government pages like www.berlin.de were searched to gain specific data on demographics and crime in Berlin. The official public transport operator's webpages were used to gather information of user regulation, transport policies and security measures taken by transport operators. Publications and reports from public transport associations were reviewed to gather background information on passenger volume and general suggestions on the implementation of security measures.

Yet, the main source to gain understanding of the situation in Berlin were newspaper articles. Berlin has several local newspapers that publish on topics relating to public transport on a regular basis. Online articles often have a comment-option which allows readers to express their opinion on the topic. For some articles these comments reflected a general public opinion on the topic related to public transport. However, the main difficulty with newspaper articles and their comments are biases. It was therefore important to use the information carefully and search for the original source of an information, which was often difficult or not possible at all.

The nation-wide research project called SUSI Plus dealt with the exact subject of the individual perception of personal safety while using public transport facilities. The research was based on intensive data collection through observations, surveys and interviews in several cities in Germany and outlined the complexity of the topic. The findings of the SUSI-Plus research project suggested that specific factors and situations influence the public transport user's perception of safety. Their findings were used to develop the survey and interview questions for this research.

Survey

The online survey was conducted using the survey provider lamapoll to develop an understanding of how different underground train stations and their surroundings are perceived

by female public transport users in Berlin. The survey was mainly shared through social media (Facebook and WhatsApp), and friends and family who live in Berlin by using a snowballing method as initial participants shared the survey with their friends and family or on social media. Since survey participants were meant to be between 18 and 50 years old and live, work, or study in Berlin, personal contacts who belong in this demographic group were contacted first. The short introduction texts that were sent with the link to the survey, as well as the introduction in the survey specified desired characteristics of the participants as well. The survey was tested and reviewed by three friends, and some minor changes, mostly in wording, had to be made before it could be made public. The survey was open for participation between April 9th and April 26th, 2021 and was answered by 106 participants.

The survey consisted of open-ended as well as closed questions. It started with the open-ended question about the participants home station, which is the most frequently used station closest to their home, followed by a rating question about how safe the participant feels at their home station. The rating was conducted on a scale from one to five with one feeling very unsafe and five feeling very safe. These two questions aimed to investigate whether participants tend to feel safer at their home station. The next two questions were open-ended and asked about underground stations the participants feel either unsafe at night (meaning they would avoid the station if possible) or feel safe at night. These two questions aimed to investigate similarities between the named stations and connections to their location. The fifth question asked participants to rate certain factors of their environment according to their impact on the participants feeling of safety. The rating was conducted on a scale from one to five, with one being low impact and five being high impact. This question aimed to investigate the impact different factors have on the participant's perception of safety. The last question asked participants to rate four different images that showed different situations according to how safe they would feel in that particular situation. The rating was conducted on a scale from one to five with one feeling very unsafe and five feeling very safe. The images showed situations that include certain factors that are suggested to influence a person's perception of safety. This question aimed to investigate whether spaces that according to existing literature, theories, and concepts are more fear arousing, are also perceived as such by the participants. The survey questionnaire was available in German and English. The survey was able to collect the data as was intended by the researcher. The survey questionnaire can be found in Appendix A.

Interview

The semi-structured interviews were carried out online, using Zoom or WhatsApp. The interviews helped to gain an in-depth understanding of the participants perception of safety by asking about their travel behavior, the frequency of usage, common trips they do by public transport, the influence of the time of the day, and whether there are certain areas or stations in Berlin that are avoided by public transport users. Furthermore, the researcher asked the participants to describe specific situations that made them feel unsafe. The interview guide can be found in the Appendix B.

The participants included friends and family (6) and people that were recommended to the researcher (4). This technique is also known as snowballing where the researcher reaches out to a number of potential contacts who then recommend other potential participants to the researcher. This was tremendously useful to find participants who the researcher is not acquainted with and get a more diverse group of participants. Without the snowballing method it would have been very difficult to find participants outside the researcher's private contacts, as the researcher was not based in Berlin at the time. The interviews took about 15 minutes each and were recorded and transcribed afterwards. Initially it was expected that the interviews would take at least 30 minutes, however after the first few interviews it became clear that participants were able to answer the questions in a very direct, yet informative, manner which reduced the expected duration of the interviews. The interviews were held in German (9) or English (1), depending on the participants native tongue as it would be easier to express feelings and describe situations in the language, they are most comfortable with. Two interviews were conducted as a pilot to test the questions and refine them if necessary. A few changes to the wording and order of the questions had to be made. Yet, these were so minor that it allowed for the pilot interviews to be part of the dataset. Since every participant reacts slightly different to the questions and has a different communication style, questions were slightly adjusted towards each participant during interview.

To get the conversation started the researcher asked the participant how often they use public transport under normal circumstances, i.e. before the Covid-19 pandemic, and what a common trip on public transport looks like for them (e.g. what lines they use, start and end point, time of the day). As the researcher is very familiar with the city's public transport network and it's different areas, this question helped to gain an understanding of the space the participant usually

moves in and is familiar with. It also revealed the frequency of usage and the general attitude the participant holds towards public transport. In addition to that the participants were asked whether public transport is their preferred mode of transportation. This question revealed different reasons on why the participants find public transport attractive or not attractive.

The next set of questions was tailored more specifically around the research question by asking about certain areas in Berlin that the participant avoids travelling to by using public transport and whether or not the time of the day had an influence on that. To get a better understanding of how underground train stations are perceived differently the researcher also asked the participant about specific stations they feel safe or comfortable at during the night. The exercise of describing different stations that are perceived as more safe or more unsafe helped to understand which factors contribute to feeling either safe or unsafe.

For the last part of the interview the participants were asked to share their experience by describing situations that made them feel unsafe while using public transport in Berlin. In this case it was helpful that most participants knew the researcher and were more willing to open up to her about a potentially sensitive topic as it can be difficult to admit feelings of fear in a specific situation.

3.3 Participants

The participants of this study were females aged 18 to 50 who live, work or study in Berlin. This specific group of women was chosen as they are more likely to travel by public transport on a regular basis and during the day as well as during the night. Alongside this, they are more likely to be familiar with the city's public transport network. The sampling procedure applied to this study was a purposive sampling combined with convenience sampling. This meant that participants who explicitly meet the aforementioned criteria were chosen. Due to the remote nature of the study, the researcher first reached out to friends and family who were available and accessible at the time and belonged to the respective group. The researcher thereby gained access to a larger group of participants. Available and accessible in this context relates to the researcher's dependency on private contacts to reach out to participants as it was not possible to get in contact with complete strangers. This limited the possibility to access a broader mix of participants, especially with regard to the age group as most initial contacts were made to

females of the same age group as the researcher. Furthermore, participants had to be willing to partake in the study.

Interview participants included ten women of whom five are students in Berlin and five who undertake full-time employment in Berlin. All participants live within the coverage of the city's public transport network. The participants were also selected because they belong to different age groups, have different travel behaviors and live in different parts of Berlin.

The survey was distributed online and relied on rightful self-selection of the participants. It was first distributed among the researcher's private contacts who then forwarded it on to their private contacts. Additionally, the survey was shared as a Facebook post on the researcher's timeline and in several groups for people in Berlin. The survey collected 106 responses between April 9th and April 26th 2021.

3.4 Data Analysis

For this case study the two methods, survey and interviews, were conducted and analyzed separately, but merged into one data base for discussion purposes. Merging the data was helpful to determine any common themes and provide possible answers to the research question.

Survey

The online survey included both open-ended and closed questions which required different kinds of analysis. As an advantage of conducting the survey online, all data was already digital and available to download as a raw data set or excel sheet from the survey providers website.

The open-ended questions were analyzed in NVivo by allocating the answers to different codes. Since the open-ended questions asked for the names of train stations, these codes were train stations, train lines, and areas of Berlin. The codes helped to determine how many participants gave the same or very similar answers. As people used different spelling versions for the same answers, it was not possible to use an automated coding tool, and instead all answers had to be coded manually.

The closed questions, that were based on a rating system with assigned values, were analyzed using descriptive statistics. Standard descriptives like frequency, answer count, mean, median, and highest and lowest value, were applied to analyze the data, while the frequency, answer

count and mean were the most informative for this study.

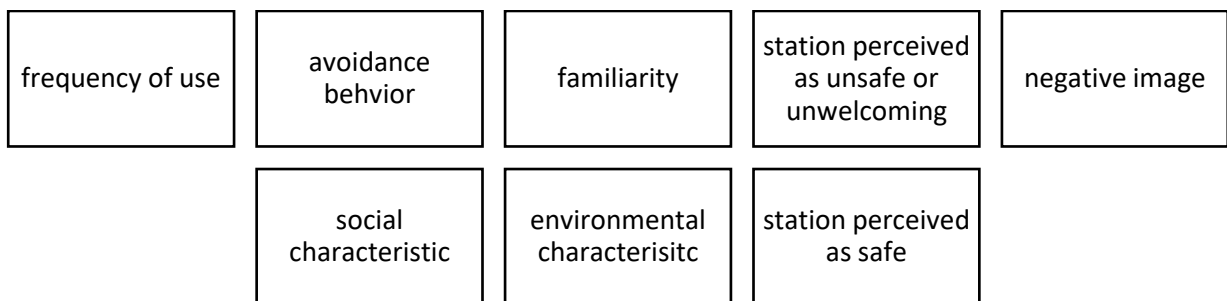
One of the rating questions allowed participants to add and rate their own answer in a free text-field. These responses had to be coded and packaged like the open-ended questions first before a quantitative data analysis could be applied.

Interviews

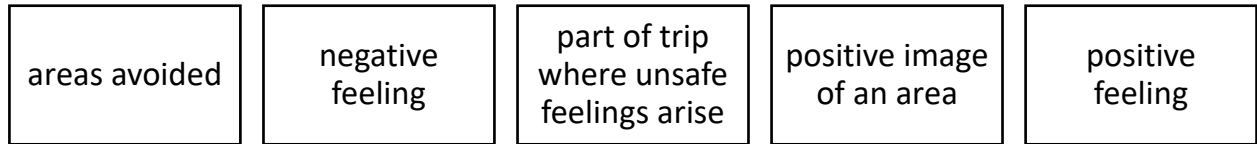
The interviews were recorded which made it possible to transcribe them later and read through them several times to familiarize with the ideas and themes that arose before the analysis was conducted. An inductive (open) coding process was carried out in NVivo. The first interview was used to create some initial codes to start with by turning different ‘ideas’ the participant talked about into codes. These ideas were usually related to topics that were known from the theory or that answered a specific question in the interviews, e.g. the code *frequency* was assigned to the answer of the question *How often do you use public transport?.* Some ‘ideas’ were neither related to theory nor the answer to a specific question. The context of the interviews coded next was either assigned to these initial codes or new codes were created for new ‘ideas’. All these ‘idea’-codes were later clustered into themes and the themes organized in a way to answer the research question. Codes could contain short phrases, sentences, or whole paragraphs.

Coding different ideas was particularly helpful to determine which ideas were dominant among the responses.

In the following the coding procedure will be illustrated more closely. The codes created from the first interviews were:



All of these codes could be applied to the other interviews as well but more ‘ideas’ came up that were put into the following codes:



After all interviews were coded, the ‘ideas’ and assigned codes were reassessed. The two codes *areas avoided*, and *negative image* were merged together as one resulted from the other. The other codes were kept, but sub-codes were created where necessary. This was especially the case for the code *social characteristic* as it was the code with the highest number of references. The following [Table 1](#) show the sub-codes created for this code.

Table 1 Code hierarchy under 'social characteristics'

Social Characteristics	Behavior outside the social norm	Aggressive and threatening behavior
		homelessness
		People begging
		People that seem weird
		Public urinating
		Feeling stared at
	Intoxication	Alcohol and drug consumption
	Male	
	Others	Being engaged in a weird or uncomfortable conversation
		Feeling followed
		Few people around
		foreigners
		musicians
		Station as meeting point

The codes helped to structure different ‘ideas’ from within but also to see connections between different codes that were referenced in the same files.

3.5 Challenges and limitations

The ongoing Covid-19 pandemic created several obstacles throughout the research process. The initial plan had been to travel to Berlin and carry out observations, informal interviews, and semi-structured interviews with women at specific train stations. However, the strict travel restrictions due to Covid-19 did not allow for travel to Berlin to take place to conduct in-person fieldwork. The research was then adjusted to collect data remotely. This allowed for a digital survey and interviews to take place, but observations and informal interviews could not be carried out. The methods that were available impacted the focus of the research as well. In order to receive a significant amount of responses the sample had to be kept fairly broad and the general focus couldn't be too narrow. Access to participants was already limited due to the remote situation which is why the sample wasn't restricted more by e.g. a smaller age group.

Some challenges and limitations were recognized for the survey in particular. The application of an online survey leads to self-selection of the participants. Thus, the researcher cannot be sure that all participants met the requirements of being female, between 18 and 50 years old, and work, study or live in Berlin. At the same time, a certain degree of self-selection bias is likely, meaning women who do experience feeling of unsafety at underground train station in Berlin are more likely to answer the survey. Furthermore, no assistance or clarification could be provided while answering the survey. The researcher, therefore, had to rely on the participants ability to understand the questions correctly.

Other challenges and limitations concerned the interview in particular. Many of the participants had not travelled by public transport in the same way they usually did for over a year, due to Covid-19. As some of the questions were rather specific, participants had to recall situations and possible emotions from the past which in some cases created a greater uncertainty or inaccuracy in their answers. Furthermore, it was difficult to get in contact with participants who were not acquainted to the researcher in any way. The snowballing method was used to get a few participants who weren't known to the researcher before, yet the researcher was limited in her choice of participants. Therefore, the variety in personal characteristics like age, family status, occupation, and ethnical background was very low.

The opportunities to collect additional data later in the process to answer possible questions that emerged during the data analysis was also limited. Creating a new online-survey or setting up

additional online-interviews takes up more time than collecting this data in-person in the field. It was therefore not feasible within the time limits of the thesis.

3.6 Ethical considerations

Every researcher engaging with human beings needs to consider certain principals of ethical responsibilities. The most important principals, which will be considered for this research, are:

- **Informed consent.** Individuals will be provided with sufficient information about the research, in a format that is comprehensible to them, and allows them to make a voluntary decision to participate in a research study.
- **Self-determination:** Individuals will have the right to determine their own participation in research, including the right to refuse participation without negative consequences.
- **Minimization of harm:** No harm will be done to any participant nor will they be out at risk.
- **Anonymity:** The identity of research participants will be protected at all times.
- **Confidentiality:** All data records will be kept confidential at all times

The research was approved by the Norwegian Centre for Research Data (NSD) and carried out according to the ethical guidelines and procedures.

The information and consent letter that was handed out to all interview participants can be found in the Appendix C.

4 Context

4.1 Berlin demographics

Berlin is the capital of Germany and its biggest city with a population of 3,77 million (Berlin-Brandenburg, 2021) citizens on an area of 891,8 km² (deutschland.de, 2021). The city is divided into 16 administrative districts (see [Figure 7](#)).



Figure 7 Administrative Districts in Berlin (SenGes, 2021)

Berlin is a very diverse city that is home to people of many different ethnical, social, and economic backgrounds. With nearly 21 %, it has the biggest foreign population of all German states and 14,7 % of the German population has a migration background. About 50,4 % of the population is female and the total average age of Berlins population is 42,6 years which makes it the second youngest of all German states (Berlin-Brandenburg, 2021).

The demographic structure, education, income, and crime rate, amongst other things, differ considerably between the different districts in Berlin. To investigate the impact a surrounding area has on the perception of safety at a specific train station, it is important to understand the dynamics and images of the different districts.

The monitoring report “Soziale Stadtentwicklung“(social city development) analyses the 436 planning areas in Berlin relating to social inequality. The planning areas are sorted into 12 indices that display the areas current condition of unemployment, social benefit reception among

employed residents, and child poverty. It also takes into account the dynamic of these factors within two years. The following map in [Figure 8](#) shows the allocation of the indices to the different planning areas (Pohlan, 2019).

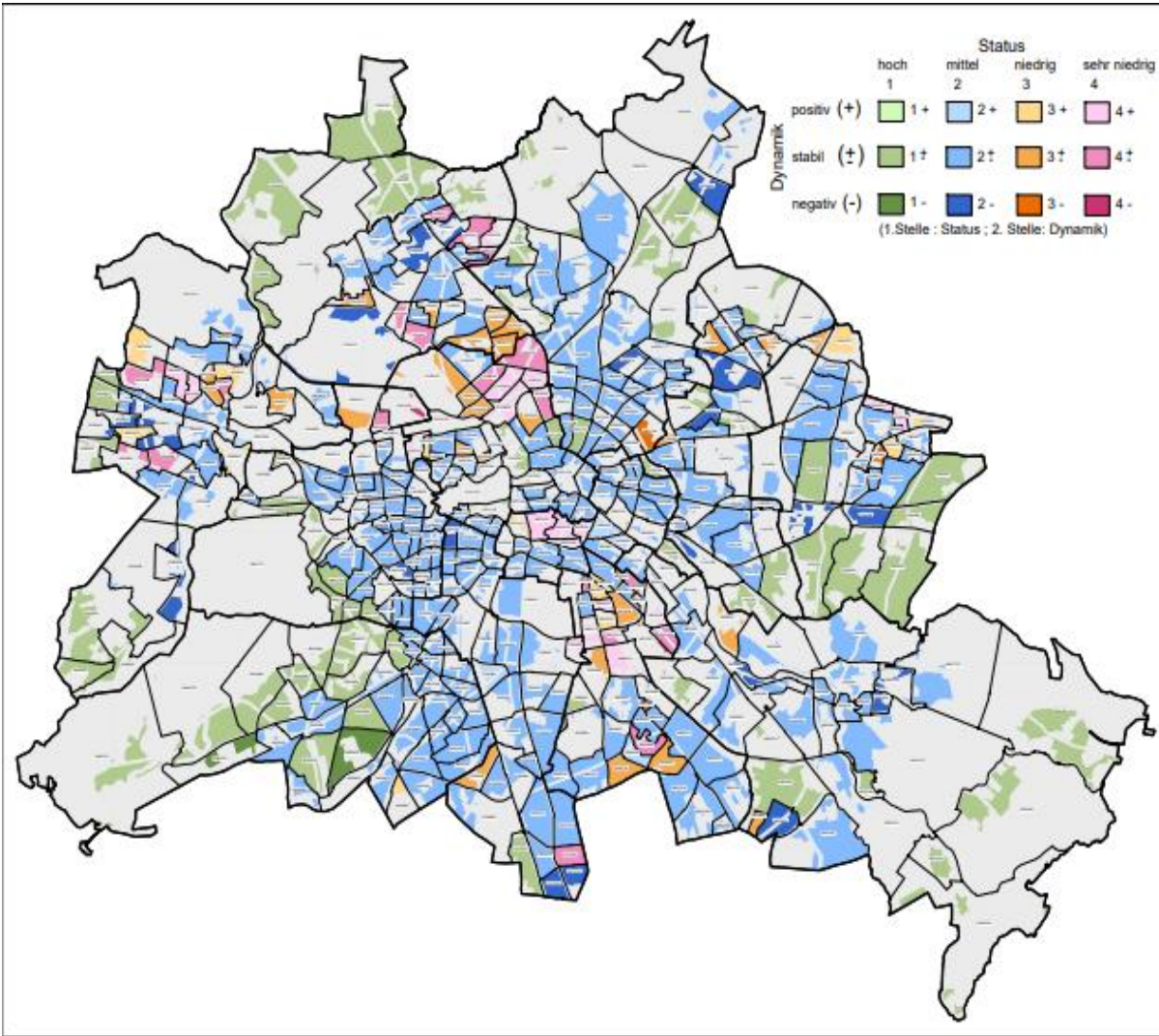


Figure 8 Social indices for the planning areas of Berlin (Pohlan, 2019)

The indices are sorted by “Status” ranging from high (green) over middle (blue) and low (orange) to very low (pink), and dynamic being positive, stable or negative. A high status indicates below-average social inequality in reference to Berlin while a low status indicates above average social inequality in the specific area.

This map shows that especially the areas North-Mitte, North-Neukölln and West-Spandau have low status indices (orange/pink) and therefore rank high in social inequality.

4.2 Crime rates

The Berlin Police Department publishes yearly crime reports that give an overview of the development of crime rates. As the Covid-19 pandemic is likely to have an influence on crime as well, the report from 2019 is used here to give a more reliable overview of crime in Berlin. The total number of crimes registered in 2019 was 513.426 (Der Polizeipräsident in Berlin, 2019). An increase has been registered in crimes against the sexual self-determination (including rape, sexual abuse and sexual assault) and drug-related offences. However, these account only for a small percentage of crimes. The majority of offences with 60,1 % accounts for robbery and fraud. Of all registered crimes, 61,5% of the victims were male and 38,5% female. 41,9 % of the victims did not suffer injury (Der Polizeipräsident in Berlin, 2019).

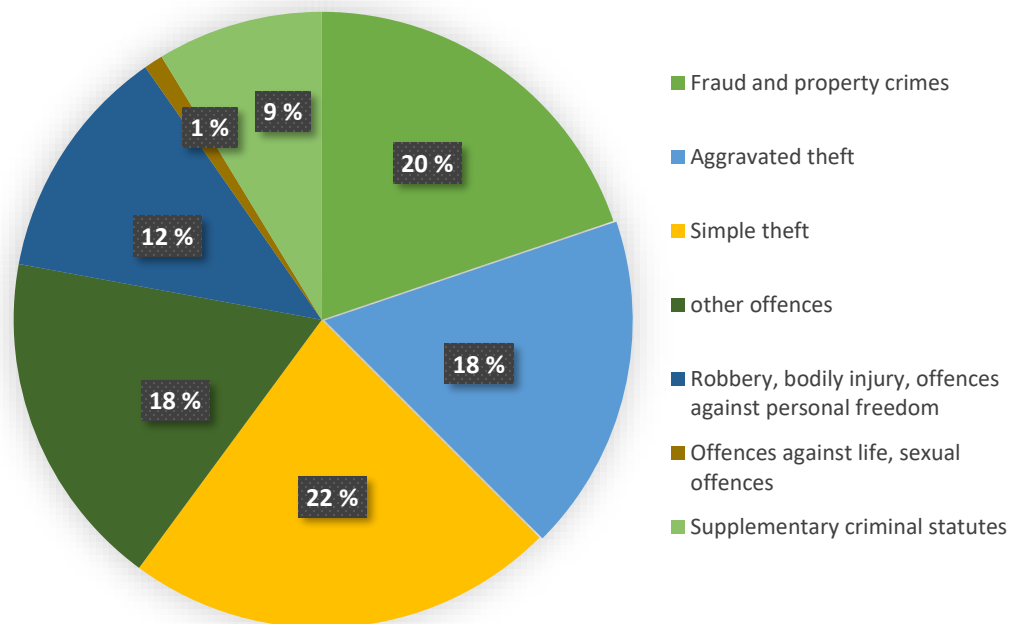


Figure 9 Percentage of crimes by crime groups (Der Polizeipräsident in Berlin, 2019)

Figure 10 shows a map with the distribution of bodily injury offences per 100.000 residents in Berlin. Most offences happen in central Berlin, which is the southern area of the district Mitte, as well as in the central area of the district Friedrichshain-Kreuzberg and one central part of Neukölln. The district Mitte has the most registered cases in general.

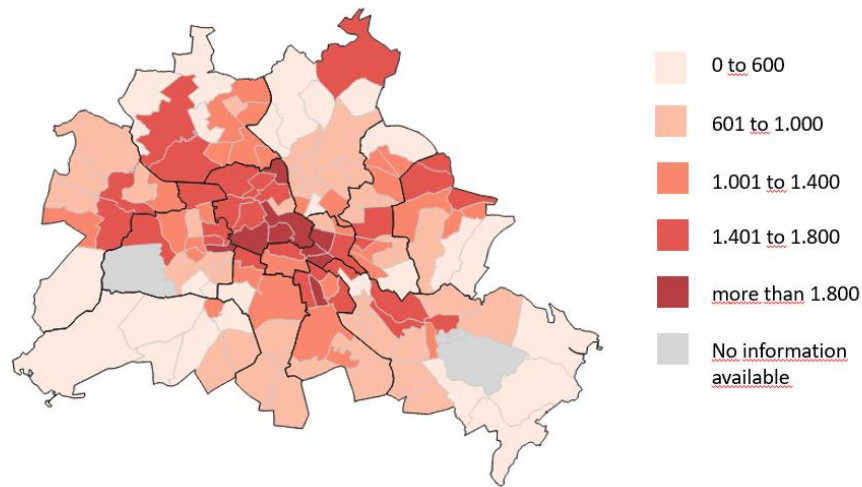


Figure 10 Distribution of total crimes of bodily injury in Berlin 2019 (Berlin, 2020)

4.3 The public transport network

The public transport network in Berlin consists of buses, trams and trains. The trains are divided into S-Bahn (city-train) and U-Bahn (underground train) as well as inter-regional trains. While the S-Bahn and most inter-regional trains are operated by Deutsche Bahn (German railways), the buses, trams and U-Bahn are operated by BVG – Berliner Verkehrsbetriebe (Berlin Transport operator).

The U-Bahn network in Berlin has nine lines, connecting 174 stations (Verkehrsbetriebe, 2020) and the S-Bahn network consists of 16 lines serving 168 stations (S-Bahn Berlin GmbH, 2020). Especially in the city center many stations combine S- and U-Bahn. The majority of U-Bahn stations is located underground while most S-Bahn stations are overground, in fact only six S-Bahn stations are underground. A full map of the public transport network can be found in Appendix D.

The design and size of the stations varies a lot depending on the number of lines and different modes that are served. The following images give an impression of the different station types.



Figure 11 U-Bahn station Wittenau (Lahs, 2016)

The image in [Figure 11](#) shows a common underground station that serves only one line. In general, the platform is located in the middle with one railway on each side, very few exceptions exist where the railways are located in the middle and the platforms are found on the outside. All stations have seating areas, information signs with timetables and a call point through which a helpline for information or an emergency line can be called. Personnel can only be found at big transfer stations. However, many underground stations have a small kiosk either on the platform or in the entrance area of the station before one follows the stairs down to the platform. If two U-Bahn lines connect at a station they commonly do so on different levels, meaning each line has their own platform of which one is located deeper than the other. In those cases, the connecting areas or corridors often host small shops as can be seen in the [Figure 12](#) and [Figure 13](#).

Bigger train stations that connect S- and U-Bahn, as well as inter-regional trains have separate platforms for each mode they serve. These platforms are usually located on different levels and are connected through several areas and corridors which typically host a variety of small food and coffee places as well as small supermarkets. They often have personnel on the platform and an information / ticket center located in one of the connection spaces.



Figure 12 Shops at U-Bahn station Osloer Straße, Source: own image



Figure 13 Shops at U-Bahn station Osloer Straße at night, Source: own image



Figure 14 Illustration of the train station Alexanderplatz (Infografik Pro, 2021)

Figure 14 gives an illustration of the train station Alexanderplatz which is one of the biggest in Berlin. It serves three U-Bahn lines and four S-Bahn lines, as well as several tram, bus, and inter-regional train lines. The total service area stretches over five levels with several shop areas and

connecting stairs, escalators, and elevators. Other train stations in Berlin that are of similar size and service area are Friedrichstraße, Hauptbahnhof, Ostkreuz, Gesundbrunnen, and Südkreuz.

Train stations in Berlin do not have access control, meaning that everyone with or without a ticket can access the platform. This allows for the train stations / platforms to turn into a social meeting point for groups rather than just a waiting area for public transport users.

4.3.1 Crime on public transport

The crime statistics from 2019 show a total of 24.725 registered crimes for that year, including crimes related to battery, coercion, robbery, and sex related crimes, as well as theft and property damage (Der Polizeipräsident in Berlin, 2019). [Figure 15](#) shows the percentage of different crime groups among the total number of crimes.

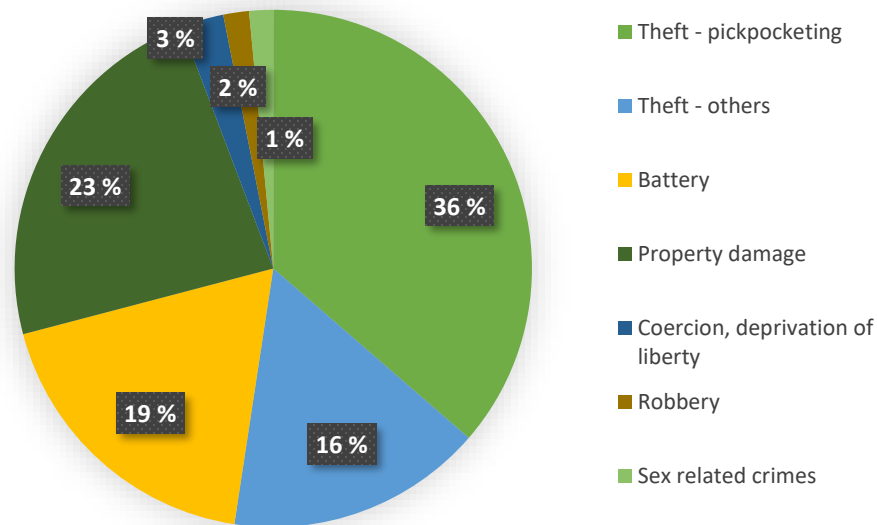


Figure 15 Distribution of crime groups on crimes committed on public transport in 2019 (Der Polizeipräsident in Berlin, 2019)

With 44,2% most crimes are committed on the S-Bahn and inter-regional trains, followed by the U-Bahn with 40,2% of all crimes. While most crime cases on the S-Bahn and inter-regional trains were pickpocketing and property damage, the U-Bahn counts especially high in coercion and deprivation of liberty, battery as well as pickpocketing. 43,6 % of all sex-related crimes were committed on the U-Bahn as well (Der Polizeipräsident in Berlin, 2019). Information about the victims and their sex was not listed in the statistics.

The public transport operators have a big interest in increasing safety around public transport and efforts have been made especially with regard to security personnel and surveillance cameras. The BVG invests more than 60 million euros per year in safety measures and cooperates with the Berlin police department (Berliner Verkehrsbetriebe, 2021). Furthermore, the BVG invested in preventive measures by informing public transport users about potential crime risks like pickpocketing and educating passengers about how to protect oneself from crimes and how to act when witnessing a crime (Verkehrsbetriebe, 2018)

4.3.2 Users perception of crime and safety on public transport

A general survey from 2012 among German citizens published by forsa, an independent institute for market and opinion research, asked 3212 residents from all German states about the perception of their personal safety on public transport. 88% of all users stated they feel safe or very safe on the public transport vehicle, while 11% feel less safe or not safe at all. Berlin rated slightly above the national average with 16% of users feeling less safe or not safe at all while being on the vehicle (forsa., 2012).

At stops or stations 36% of all users expressed feeling less safe or not safe at all. In this case Berlin rated slightly below the national average with 34% feeling less safe or not safe at all. Users in Berlin particularly felt less safe while being on the public transport vehicle (44%) and when waiting at the stop or station (48%) compared to the years before (forsa., 2012).

The BVG's user satisfaction survey was published in their safety report with the latest version from 2018. It shows that passengers feel safer traveling by bus and tram compared to the U-Bahn and that the waiting time at the station is perceived as most unsafe. The time spent on the public transport vehicle is perceived a lot better on the bus and tram than on the U-Bahn. The factors that contribute most to a feeling of unsafety are threatening persons at 81%, followed by bad lightning at 15%. Factors that increase the feeling of safety are personnel with 69%, and video surveillance at 15% (Verkehrsbetriebe, 2018).

The project group SuSi-team investigated the subjective perception of safety of public transport users in Berlin and Brandenburg to understand the connection between the user's perception of safety and the safety measures put in place by public transport operators. The survey conducted for this research project found that alcohol consumption by other passenger has a big influence on the individual's perception of safety. Other social groups that can lead to a feeling of unsafety

are teenagers, unfriendly people, and aggressive people. Besides these factors stemming from the people around us, a range of factors related to the general infrastructure are named as well. These include cleanliness, absence of other passengers, absence of personnel, and fear of victimization. A general question about the user's perception of personal safety received positive feedback with only 11% stating that they do not generally feel safe and 1% saying that they never feel safe (Hempel, 2011).

The issue of personal safety on public transport receives a lot of media attention as well.

Newspaper articles introduce the topic with headlines such as:

“Train station need more personnel – for increased safety” – der Tagesspiegel, 2018

“These are the most dangerous U-Bahn stations in Berlin” – Welt, 2018

“Drug-Hostpot: U-Bahn station Kottbusser Tor and Schönleinstraße“ – Süddeutsche Zeitung, 2019

The Tagesspiegel article mentioned that there are a total of 30 to 40 problem stations at which security personnel should be increased. The current 200 security agents are not enough and twice as many would be needed to keep public transport safe and attractive for its users (Kurzjuweit, 2018).

Newspaper articles and other media attention on the topic can create a more extreme image on the situation than what is found in reality and have the influence to create bigger concerns among public transport users. The article from Welt, for example, mentioned that sex-related crimes have increased three and a half times between 2013 and 2017 (Rößner, 2018). Looking at the total numbers this is correct, yet what they don't mention in the article is that the definition for sex-related crimes was changed in 2016 and therefore a lot of offences that were previously counted under a different crime group are now assigned to sex-related crime (Der Polizeipräsident in Berlin, 2019).

5 Results and Findings

To make and keep public transport in Berlin attractive for its users, it is crucial that public transport users can enjoy their travel without fearing to become a victim of crime. Although the statistical likelihood to be victimized is relatively low (Kim, 2019, Delbosch and Currie, 2012), especially women experience a reduced feeling of safety which in the worst case leads them to avoid traveling by public transport at all. The results and findings of this study are based on an online survey with 106 participants and online interviews with ten participants. All participants were female, between 18 and 50 years old, and work, study or live in Berlin. The aim was to investigate how external factors that stem from the environment, influence the participants perception of safety when using the S- and U-Bahn facilities in Berlin. This includes the time spent on the train, the stations and the area surrounding the stations.

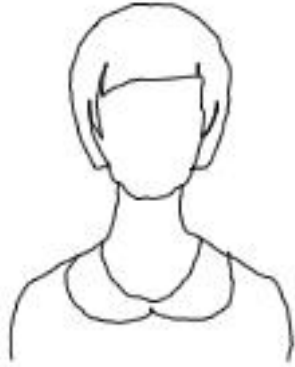
The results and findings are divided into three main topics. First, a general picture of how women use public transport will be outlined by presenting different user profiles as well as the overall attitude the participants hold towards public transport in Berlin. Second, the specific environmental factors that participants mentioned as impacting their perception of safety will be analyzed, and third, the results and findings relating to the importance of the participants familiarity with an area and the image of an area will be presented.

5.1 Women on public transport

This section will outline the relationship women have towards public transport in Berlin. The results are based on the ten interviews and the survey. It shows that women use public transport for different purposes and that their attitude towards public transport depends on the individual's character and preferences. Yet, many respondents stated that they would avoid public transport at certain times of the day or in specific areas in the city if they had the opportunity to do so.

5.1.1 Usage of and general attitude towards public transport

To illustrate the different travels behaviors and attitudes among female public transport users, the following personas were created. The personas are based on the information gathered through the interviews.



- University student
- Lives in the city center
- Uses public transport daily to go to university, work, visit friends and family, evening events
- Travels mostly during the day and late evenings, occasionally during the night

“Public transport is my preferred mode of transportation. It is better for the environment and I really wouldn’t want to use a car in Berlin, that is just very exhausting, and distances are often too far for cycling. Public transport is very pleasant and very well run, also at night.”



- High school student
- Lives in the city center
- Uses public transport daily to get to school, visit friends and family
- Travels mostly during the day

“I use public transport to go to school and it acts as sort of meeting point as many friends join along the trip. Its where we spent most of the time together outside school. I find it very pleasant to travel by U-Bahn. It gets me where I need to go, and I am very familiar with it.”



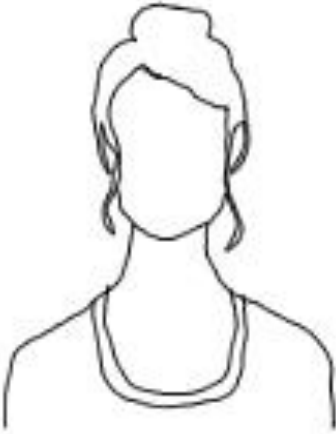
- Young women (25-30 yrs old)
- Lives in the outskirts of Berlin
- Uses public transport occasionally to meet with friends in the city center
- Travels mostly in the afternoon and evening

“I use public transport because it is the easiest transport option. It is almost impossible to find parking in the city center and if I want to have some drinks I can’t drive home by car anyway. If taxis weren’t so expensive I would prefer to use them to get home at night.”



- Adult women (40-50 yrs old)
- Lives in the city center
- Uses public transport daily to commute to work, meet friends for social outings
- Travels mostly during the day and evening, occasionally during the night

“Public transport is my preferred mode of transport, because it is accessible and very convenient here in the city. It is quite well run and also well connected. I would like to have my own car, out of convenience, but it doesn't really make sense to have my own car here in Berlin”



- Young women (25-30 yrs old)
- Lives in the outskirts of the city
- Uses public transport rarely, only when necessary
- Travels mostly during the day when she does

“I prefer to cycle or travel as a passenger in a private car rather than use public transport. I find it very stressful to use public transport. It is very loud and busy and not always possible to keep a distance to other people which can be very unpleasant. Cycling is more relaxing for me and also better for the environment.”

From the interview responses it was clear that especially women living in the city center use public transport on a daily basis and use it as their main mode of transportation to get to university or work, meet with friends, and go out. Participants who reside on the outskirts of the city often had a car at their disposal which they would use for trips in their area but avoid travelling into the city by car, mostly due to a lack of parking opportunities. For respondents who stated that they use public transport daily (during the week) the commute to work or school was their most common trip. Respondents who didn't use public transport for their daily commute stated they only used it “once every two weeks” or “fairly seldom, only when it can't be avoided”.

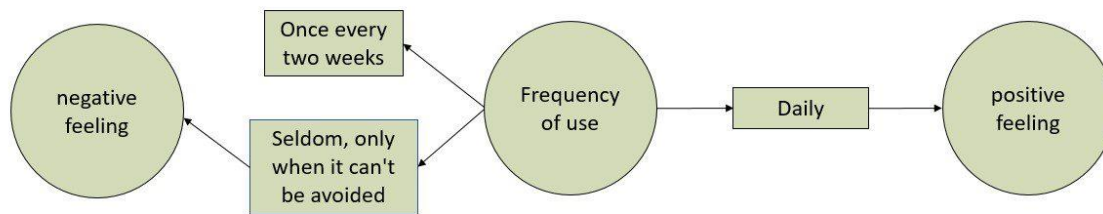


Figure 16 Relation between the frequency of use and the feeling associated with public transport among interviewees

Figure 16 shows the relation between the frequency of use and the feeling interview participants associate with public transport. Out of the ten interview participants, 8 stated that they use public transport on a daily basis. All of them also expressed a positive feeling towards public transport in general, as they find it “very convenient”, “accessible”, “well connected within the city”, “never have to wait long”, “pleasant”. The one participant who uses public transport very rarely expressed a generally negative feeling towards public transport, as she mentioned it to be “very stressful to travel by S- and U-Bahn.”

5.1.2 Avoidance behavior

Although most participants find it convenient and pleasant to travel by public transport, they do avoid travelling through certain stations or on certain lines especially at night. The so called avoidance behavior that participants adopt to avoid situations that can cause a feeling of unsafety and therefore stress, often includes choosing alternative routes, alternative modes of transport or limiting their time out to be able to go home when they still feel safe. Six of the interview participants have mentioned such avoidance behavior during the interview. One interviewee described how her perception of safety on certain underground train lines impacts her decision on where to look for a new apartment. As she said, “I am not very fond of the U7 and U8 lines, so I want to move somewhere else where I don’t need to go into these lines or go to these stations.”

Other interview participants mentioned that they prefer to use the bus or tram rather than the train or even a taxi if they could afford it.

The survey asked participants whether there are certain stations that they try to avoid after dark. 50% of the participants named specific stations or areas in Berlin that they avoid if possible, while 19% said that there are no stations they would avoid. Other survey participants said that

they generally avoid stations that are very quiet during the night, that they are unfamiliar with, or that they avoid public transport/the underground train in general.

5.1.3 Summary

Women use public transport for a variety of purposes. Participants living in the city center of Berlin stated that public transport is their preferred mode of transportation for the daily commutes to work or school, to visit friends and family, and to reach other activities. Participants who live more on the outskirts of the city use public transport less regularly. Those who use public transport on a daily basis have a more positive attitude towards public transport. These participants value the connectivity the service provides, the frequency within the city, the accessibility and convenience, and that their rides are usually perceived as pleasant.

Six out of the ten interviewees and 50% of survey participants stated that they avoid certain stations or areas of the city due to a perceived lack of safety, especially at night. Such avoidance behavior includes taking detours, changing to an alternative mode of transport like bus/tram or taxi, or not staying out after a certain time in general.

5.2 Factors that influence the perception of safety

This section will present the different factors that influence the participants perception of safety. The results are based on both the survey and interviews. Based on the participants answers it became clear that most factors can be divided into those stemming from the physical environment and those stemming from the social environment. Alternatively, some factors are linked to individual characteristics and experiences rather than the surrounding environment. These will be mentioned as well but not taken into further consideration as including information on the participants individual backgrounds would exceed the scope of this research.

One question in the survey asked participants to rate four different images according to how safe they would feel in that specific space. The images show different public transport stations which, according to the presented theories, should be either fear arousing or giving the user a feeling of safety. The rating happened on a scale from one to five, with one feeling very unsafe (feelings of fear can arise, and the station will be avoided if possible) and five feeling very safe (no safety concerns). [Table 2](#) summarizes the specific factors of each image. In these images physical and social factors can be found.

The responses show that people feel most unsafe in the space shown in Image 4, which illustrates a narrow platform with only very few people on it. In Image 4, there is a liquid running down the platform which could be just water, but also urine or blood. The person who is sitting on the bench is very hard to identify and looks like he/she could be a homeless person or in some way intoxicated. There is no exit in sight and the lighting on the station is sufficient but not great. 24% of the participants rated the image with a 1, meaning that they would feel very unsafe, feelings of fear can arise, and the station would be avoided if possible. The average rating is 2.29.

Followed by Image 1 with an average rating of 2.86. Image 1 shows a very narrow passage with trash on the ground and some dark corners. There are only two other people and the exit is not in sight. At least one of the two people seems to be a woman with a buggy. 9,6% of participants reported that they would feel very unsafe in this space, yet most people rated it between 2 and 4, which indicates that individual characteristics may play a more important role in this case.

The space perceived as safest can be seen in Image 3 with an average rating of 4.38. It is a very spacious station with a wide platform and high ceiling. The lighting is very good, exit routes are in sight and several signs give information to the users. Many people are leaving the train and are walking towards the exit. 56% of participants rated that image with a 5, meaning they would feel very safe, having no safety concerns in this space. Another 35% rated the image with a four, meaning they would feel generally safe. 3,8% rated the station as not feeling safe. Those responses could be false, as participants have misunderstood the rating scale or participants do actually feel very unsafe in this space because of personal experiences or characteristics.

Image 2 received an average rating of 3.8. It shows a very busy platform with a spacious station layout. The exit is clearly visible and so are information signs. The station is clean and well lit. 35% of respondents rated the station with a 4 and 33% with a 5, which means that the station is generally perceived as safe. 26% of respondents rated the station with a 2 or 3, and only 4% rated the station as feeling unsafe. The very low percentage of participants stating they would not feel safe could be reasoned similar to Image 3, that participants have misunderstood the rating scale or their feeling of unsafety stems from personal experiences or characteristics. Furthermore, the train station seen in this image is a very popular one that is known to most people and could hence be recognized by participants. It is possible that the rating of this image does not only stem

from the observation of the image, but also from personal opinions and experiences about this specific station.

Table 2 Summary of survey results on the image rating



Image	Factors	Average rating
 <p data-bbox="204 1073 310 1108">Image 1</p>	<ul style="list-style-type: none"> • Narrow long passage • Seems closed off in the end, no exit in sight • No signs indicating way • Dark corners • Trash on the ground • Only two other people of whom one is a female with a buggy 	<p data-bbox="1341 443 1403 478">2.86</p>
 <p data-bbox="204 1745 310 1780">Image 2</p>	<ul style="list-style-type: none"> • Wide platform • Exit in sight • Signs indicating way • Well lit • Clean • Many people around 	<p data-bbox="1349 1283 1395 1318">3.8</p>



Image 3

- Very spacious station
- Exit in sight
- Signs indicating way
- Very well lit
- Very clean
- Many people leaving from the train

4.38



Image 4

- Narrow platform
- No exit in sight
- No signs indicting way
- Not very well lit
- Liquid (urine, blood, or water) on the ground
- Very few people
- Person on bench is hard to identify

2.29

Table 3 summarizes the factors occurring in stations perceived as safe compared to those perceived as not safe or somewhat unsafe.

Table 3 Summary of factors linked to stations perceived as safe or unsafe

Stations perceived as safe (Image 2 and 3)	Station perceived as somewhat unsafe (Image 1)	Station perceived as unsafe (Image 4)
<ul style="list-style-type: none"> • Spacious • No obvious trash • Busy stations with a lot of other people around • Exit in sight • Information signs • Good lighting 	<ul style="list-style-type: none"> • Narrow passage • Trash on the ground • Two other people, of whom at least one seems to be female • No exit or information signs in sight • Dark corners • Unclear view 	<ul style="list-style-type: none"> • Narrow platform • Undefined liquid on ground • Few people on the platform • One person seems homeless or intoxicated • No exit or information signs in sight • Not well lit

As these images include physical as well as social factors of the environment, the next sections will investigate these two aspects separately to determine whether one weighs more than the other or in which combination they impact the feeling of safety the most.

5.2.1 Physical environment

The physical environment includes the design of a station in general, e.g. whether it is narrow or wide, as well as more specific features, e.g. the lighting or cleanliness. It also includes damages that have been done to the built environment, e.g. graffiti or vandalism.

Survey answers

In the survey participants were asked to rate the following factors of the physical environment according to how they impact their feeling of safety. One star was given for low impact, meaning the person feels safe, and five stars were given for high impact, meaning that feelings of fear can arise. In addition, participants were able to add and rate their own answers in an open text field.

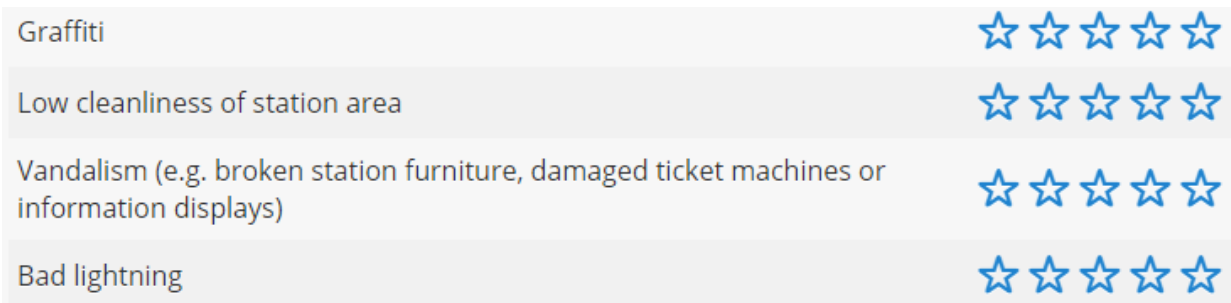


Figure 17 Factors of the physical environment to be rated by survey participants (one star = feeling safe; five stars = feeling unsafe)

Out of these four factors it appears, bad lighting and vandalism impact the feeling of safety most negatively, while graffiti has a very low impact on the participants perception of safety. Table 4 shows the average star rating for each factor, and Figure 18 illustrates the percentages of the responses. Graffiti was rated with one or two stars by most participants, meaning that the participants don't necessarily feel less safe when a station is tagged with graffiti. Low cleanliness of the station area received an average of 2.7 stars, which ranks it higher than graffiti but the overall impact on the feeling of safety is moderate. Vandalism received an average of 3.29 stars with 52% giving four or five stars, meaning that it has a distinctive influence on how safe the participant feels in that environment. Bad lighting received the highest average of 4.48 stars. It can be seen that no participant gave one star and only 2.9% of participants gave three stars. Bad lighting is the factor that influences the perception of safety most severely out of these four, and where participants agree strongly with each other.

Table 4 Average star rating of factors of the physical environment by survey participants

Factor	Average star rating
Graffiti	1.53
Low cleanliness of station area	2.70
Vandalism	3.29
Bad lighting	4.48

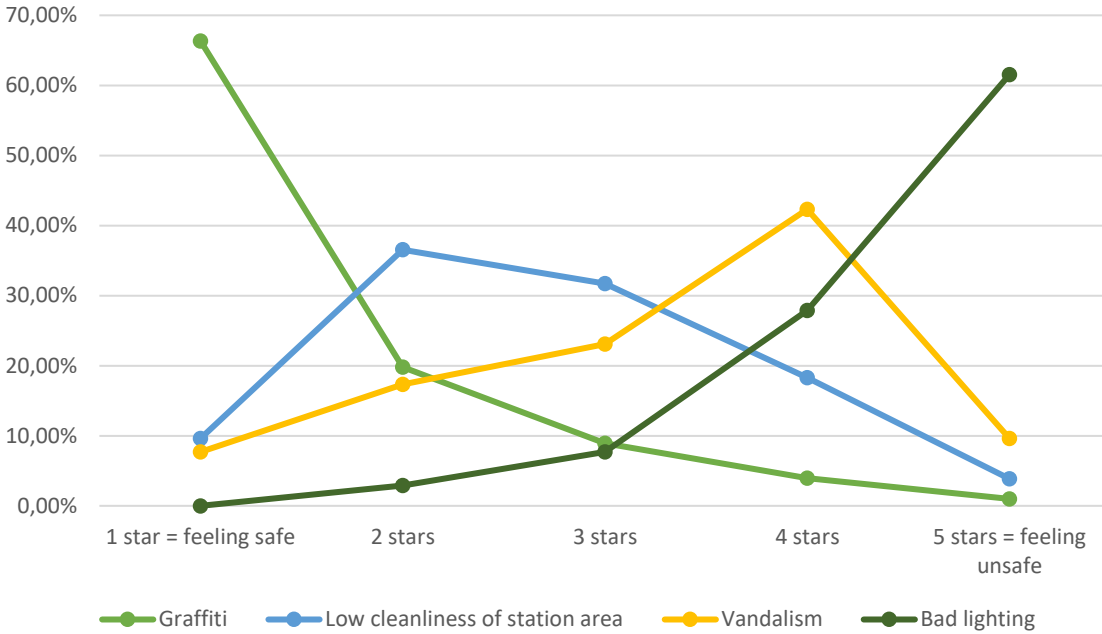


Figure 18 Percentages of survey responses for factors of the physical environment

Among the additional answers given by participants, the following can be assigned as factors of the physical environment:

Table 5 Additional environmental factors given by survey participants

Factor	Rating in stars
Images, Posters	1
Obvious CCTV surveillance	1
Good lighting	1
Big, modern, light station	1
Station is very big	3
Small, old station	3
Poor visibility/overview of the station	3 and 4
Narrow passages that seem closed off	5
Bad overview, e.g. long passages	4
Only one entry/exit	5
No CCTV surveillance	4

The responses show that factors like images/posters, CCTV surveillance, good lighting and a generally good condition (modern) of the station have a low impact on the feeling of safety, meaning that people feel safe when these factors are existent.

Factors that influence the perception of safety to a certain degree (3 star rating) are very big stations, small and old stations, and poor visibility/overview of the station.

The biggest influence on participant’s perception of safety (4 and 5 star ratings) are narrow passages that seem closed off, poor visibility/overview of the station, only one entry/exit existent, and no CCTV surveillance.

The ratings summarized in [Table 4](#) and [Table 5](#) show that factors that influence how good the surroundings can be overseen influence the perception of safety the strongest. Bad lighting, narrow passages, long passages, and a generally poor visibility contribute to uncertainty about the surrounding space and therefore decrease the participants feeling of safety.

Interview responses

During the interviews, participants were asked about train stations or areas in Berlin they would avoid if possible, as well as to describe situations that made them feel unsafe. Participants mentioned a variety of factors as reasons for their feeling of discomfort and unsafety at certain stations or in particular situations. The factors that can be assigned to the physical environment are summarized in [Table 6](#). Participants often gave a certain explanation on why these factors make them feel unsafe. Some of these factors can be grouped together under the same reasoning. The number of interviewees who mentioned a certain factor during the interview is shown in the count-column.

[Table 6](#) Environmental factors and their reasoning mentioned by interview participants

Factors of the physical environment	Count	Reasoning
Very big station	1	Not clear which exit needs to be taken to get to a specific street, not obvious were to go or find certain things
Many exits	2	
Confusing station layout, exits not clearly indicated	2	
Bad lighting	2	

Very narrow platform	2	Fear of being pushed onto the railway by someone, not able to keep sufficient/safe distance to the railway, not able to avoid other people/keep a distance from them
Close to the railway	1	
Being “closed off” in the underground station	2	Feeling that help is further away/can’t be reached
Lack of fresh air in the underground stations	3	
Underground stations are scarier when there is not very busy, it is quiet, and one is alone	1	
Very dirty, not well maintained	2	Station seems less safe or welcoming when there is a lot of trash or rubbish
Graffiti	1	
Stations that are old, badly maintained, and coercive	1	

The responses show that especially factors that influence the overall view on the platform but also over the station’s layout appear to influence the participants perception of safety. Station designs that are confusing, where exits are not clearly marked or where no obvious directions to connecting lines are given, are perceived as less welcoming and stressful. The closeness and narrowness that participants experience especially on underground stations is also perceived as less welcoming and stressful. Narrow platforms give the feeling that it is not possible to keep the desired distance to other people on the platform or to the railways. Some participants mentioned the lack of fresh air as a factor contributing to their overall feeling of discomfort or unsafety. Another important factor that participants mention in connection with underground stations is the uncomfortable feeling of being closed off from the world and that no help is within reach if it is needed.

Summary of survey and interview responses

Comparing the interview and survey answers it can be seen that interviewees came up with the same factors as were given to the survey participants, except for vandalism. None of the

interviewees specifically mentioned broken station furniture or other forms of vandalism as a factor that influences how safe they feel. Graffiti, low cleanliness of the station area, and bad lighting was mentioned by the interviewees. In the open text field answer of the survey, participants added factors that are congruent to the interviewee's responses. These include very big stations, narrow passages that seem closed off, poor visibility/overview of the station, and old stations. One factor that was mentioned by survey participants but not by any interviewee is CCTV surveillance.

Summarizing the answers given in the survey and interviews, the following factors appeared to influence the perception of safety the strongest:

- Factors that contribute to poor visibility / overview over the station
 - Bad lighting
 - Very big stations
 - Confusing station layout
 - Many exits
- Factors that contribute to the feeling of not being able to avoid other people or situations
 - Narrow platform
- Factors that contribute to feeling closed off and not in reach for help
 - Narrow long passages
 - Being underground
 - Lack of fresh air

Vandalism has been rated high in its influence on the perception of safety in the survey but wasn't mentioned by any of the interview participants. It is therefore assumed to be subordinate to the factors mentioned above. The same accounts for low cleanliness and graffiti in the stations' area which have been rated low in the survey and were mentioned only a few times during the interview with the connotation of making a station less welcoming but not necessarily unsafe.

5.2.2 Social environment

The social environment includes factors that relate to the people a space is shared with. These can be fellow transport users, station staff, or people being in the station without the purpose of using the public transport service. The factors can be the absence or presence of these people as well as their behavior.

Survey answers

As with the physical environment, survey participants were asked to rate certain factors that stem from the social environment according to how they influence their feeling of safety. The rating was based on a star-system in which one star was given for low impact, meaning the person feels safe, and five stars are given for high impact, meaning that feelings of fear can arise. In addition, participants were able to add and rate their own answers in an open text field. [Figure 19](#) shows the factors that were given in the survey. Out of these four factors, ‘Groups that seem unpredictable due to intoxication or other reasons’ impact the feeling of safety strongest with an average of 4.81 stars, followed shortly by ‘Individuals that seem unpredictable due to intoxication or other reasons’ with an average of 4.57 stars. ‘Very empty stations with only a few more passengers waiting’ have a medium impact with an average rating of 3.43 stars and ‘very busy stations with a lot of other passengers waiting’ are generally perceived as safe with an average rating of 1.64. An overview of the average star rating of each factor is given in

The ratings show that factors which include unpredictability in behavior of individuals or groups impact the perception of personal safety a lot. [Figure 20](#) illustrates the percentages of survey responses given to each of the four factors.

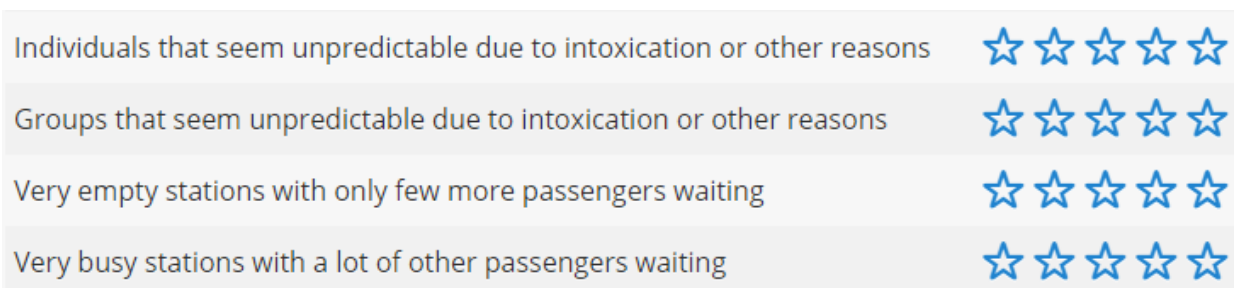


Figure 19 Factors of the social environment to be rated by survey participants

Table 7 Average star rating of the factors of the social environment rated by survey participants

Factor	Average star rating
Individuals that seem unpredictable due to intoxication or other reasons	4.57
Groups that seem unpredictable due to intoxication or other reasons	4.81
Very empty stations with only few more passengers waiting	3.43
Very busy stations with a lot of other passengers waiting	1.64

None of the participants rated these two factors with one star, meaning they would feel safe, and only very few gave two stars. Five stars, meaning that feelings of fear can arise, were given by 69,5% of the participants to ‘individuals whose behavior seems unpredictable’, and by 85,7% of the participants to ‘groups whose behavior seems unpredictable’.

When it comes to the busyness of a station, participants feel safer with a lot of people around compared to only a few people around. 57,7% participants feel safe at a busy station and another 29,8% feel mostly safe (2 stars). A very empty station with only a few other passengers waiting is perceived as safe by only 6,7% of the participants, while 56,7% rated it with four of five stars. The range of stars given to this factor indicates that empty stations have a tendency to make public transport users feel less safe but individual experiences and characteristics play an important role as well.

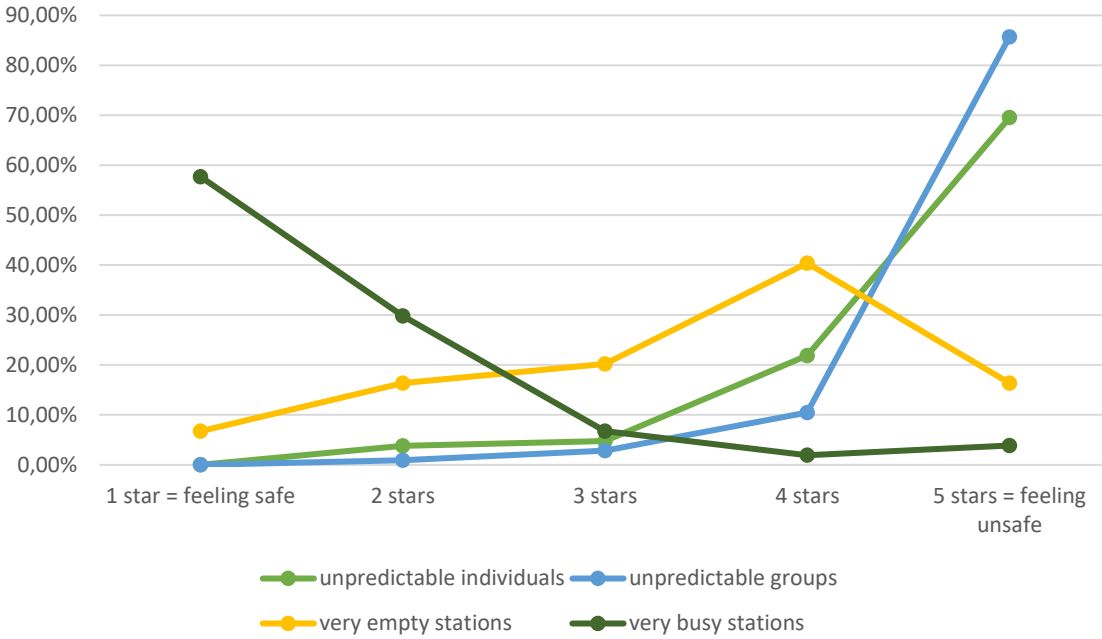


Figure 20 Percentages of survey responses for factors of the social environment

The free text field answers given by participants that can be assigned to the social environment are summarized in [Table 8](#).

Table 8 Additional social factors given by survey participants

Factor	Rating in stars
Station personnel	1 star, named twice
No security personnel present	4 stars
Loud people	4 stars
Homeless people hanging out in the station	5 stars
People who talk to you weird or rude	5 stars
Other women present	1 star
No women around	5 stars
Only queer person among male passengers	5 stars
Groups of men in general	5 stars

These factors show that the presence of personnel contributes positively to the perception of safety, as two participants rated the presence of personnel with one star and one participant rated

the absence of personnel with four stars. The answers “loud people”, “homeless people”, and “people who talk to you rude or weird” can be grouped under “people whose behavior is outside the social norm”. This implies that there is a certain code of behavior that should be followed, e.g. to not disturb other passengers, to be polite etc. People who don’t act within this social norm are perceived as threatening and therefore impact the feeling of personal safety. These answers have been rated with four and five stars. Furthermore, the gender of the surrounding people plays an important role for some participants. It has been mentioned that groups of men in general impact the participants feeling of safety strongly (5 stars) and so does the absence of other women (5 stars), while the presence of other women influences the participants perception of safety positively (1 star). Another participant who identifies as queer mentioned that being surrounded by only male passengers contributes to a feeling of unsafety (5 stars).

Interview responses

During the interview participants were asked about certain stations they feel less safe at and that they would avoid if possible, as well as to describe a situation that made them feel unsafe. As with the environmental factors, interview participants responded with certain factors that can be assigned to the social environment. These responses are summarized in [Table 9](#). In contrast to the factors of the physical environment, participants did not give much reasoning on why the factors they mention make them feel unsafe. However, the factors described can be grouped under certain keywords. The number of interviewees who mentioned a certain factor during the interview is shown in the count-column.

Table 9 Social factors and their reasoning mentioned by interview participants

Keyword	Factors of the social environment	Count	Reasoning
Intoxication	Alcohol and drug consumption	9	Behavior is less predictable; it can’t be trusted that they “use their brain”
Behavior outside the social norm	Aggressive and threatening behavior	6	Perceived as very threatening when situation can’t be avoided, e.g. not enough space

	Homeless people	4	
	People begging	4	
	People that seem weird	5	
	Feeling stared at	3	
	Feeling followed	2	
	Being engaged in weird or uncomfortable conversation	3	
	urinating in the station area	2	
Males		9	
Others	Not a lot of people around	5	Absence of help if needed
	Station used as meeting point	5	Used by certain people, e.g. homeless people or groups who are drinking/taking drugs, to hang out.
	Foreigners	2	
	Musicians	1	Usually nice but potential for confrontation

The answers show that *intoxication*, which can be the use of alcohol and/or other drugs, is the most named factor that came up in nine out of ten interviews. It was usually mentioned in a general manner of “this station/area is known for a lot of alcohol/drug consumption” which is reason enough for the participants to avoid that station or area. In some cases participants made more specific statements by saying that being “on the train with a man who is drinking beer and there are no other passengers around” makes them feel unsafe, or they had been “harassed by a person who was intoxicated”. Some participants explained that intoxicated people are unpredictable in their behavior and one can’t be sure “what they will do when they are so

uninhibited”. Overall, intoxication is the most mentioned factor that received 19 references during the interview coding process.

The keyword *behavior outside the social norm* includes a range of different factors such as homelessness, begging, urinating in the station area, aggressive and threatening behavior, feeling stared at, and simply people who are perceived as weird for various reasons.

Aggressive and threatening behavior has been mentioned by six of the interview participants, usually when they spoke about specific experiences they had in the past.

Homeless people and begging was mentioned by four of the participants, of which three put homelessness in connection with begging. Five participants talked about people that seem weird, who they cannot really associate with one of the aforementioned groups of intoxicated or homeless people. Another explanation for the more general term of “weird people” could be the participants hesitation to stigmatize a person as homeless or a drug-addict, for example.

The factors feeling stared at, feeling followed, and being engaged in weird or uncomfortable situations all stem from receiving a form of unwanted attention from other users of the transport facility, that the participants are not sure how to react to and therefore experience feelings of discomfort and insecurity.

The keyword *male* was added, because nine out of ten interview participants described situations where the person responsible for their reduced feeling of safety was male. In none of these situations was a woman made responsible for a lack of perceived safety. The one participant who did not mention a male person, had not experienced a specific situation that made her feel unsafe. A total of 14 situations that provoked feelings of unsafety were described by the participants. In nine of these the person acted in an aggressive or threatening manner by yelling at and harassing other passengers. In two cases participants felt stared at, in two other cases they felt followed by someone, and in one case the participant was engaged in an uncomfortable conversation. In two cases participants specifically said that the person threatening them seemed intoxicated.

The factors that are summarized under *other* include there being not a lot of other transport users around, a station being used as a meeting point, foreigners and musicians. Five of the interview participants mentioned that the absence of other people makes them feel less safe or that the presence of other people makes them feel safer, reasoning that there are people to seek help from if necessary. Another five participants mentioned that they feel less safe, when a station is used

as a meeting point by certain people and that they try to avoid stations that are known for such. Three of those five participants mention this factor as a more general point, that they perceive it as less safe when people are just “hanging in the stations” and that their main purpose of being in the station is not to use the public transport service. The other two participants specifically mentioned stations that are known for people meeting there to do drugs or drink alcohol, or for homeless people to hang out there.

The other two factors, foreigners and musicians, were mentioned by only two and one participant(s) and seem to originate from the participants individual experiences or characteristics rather than a general perception.

5.2.3 Summary of survey and interview responses

Comparing the survey and interview responses it can be seen that many answers overlap, yet the interview responses give more insight and are more detailed. Three main factors, that were most dominant among the survey and the interview responses, have been extracted and are summarized here.

The first factor is *Unpredictability of another person's behavior* which can be divided into intoxication and behavior that is outside the social norm. These have sub-factors assigned to them according to the participants responses. Survey participants rated “Groups that seem unpredictable due to intoxication or other reasons” as most negatively influencing their perception of safety, shortly followed by “Individuals that seem unpredictable due to intoxication or other reasons”. The most dominant responses among the interview participants was alcohol and drug consumption by other people, as it can result in unpredictability of their behavior. Behavior that is outside the social norm was brought up by interview participants as well as in the free text field answers of the survey. These behaviors include aggressive and threatening behavior, homelessness, begging, receiving unwanted attention, and a general perception that a person is somewhat weird. These behaviors that are outside the social norm result in a feeling of unsafety because they are less predictable. The factors intoxication and behavior that is outside the social norm can therefore be summarized under *Unpredictability of another person's behavior*. Figure 21 displays the hierarchy of reasons for unpredictable behavior based on the participants answers. Although intoxication often results in behavior outside the social norm, the

two are considered separately as participants did not always put them in connection and other reasons for such behavior are possible.

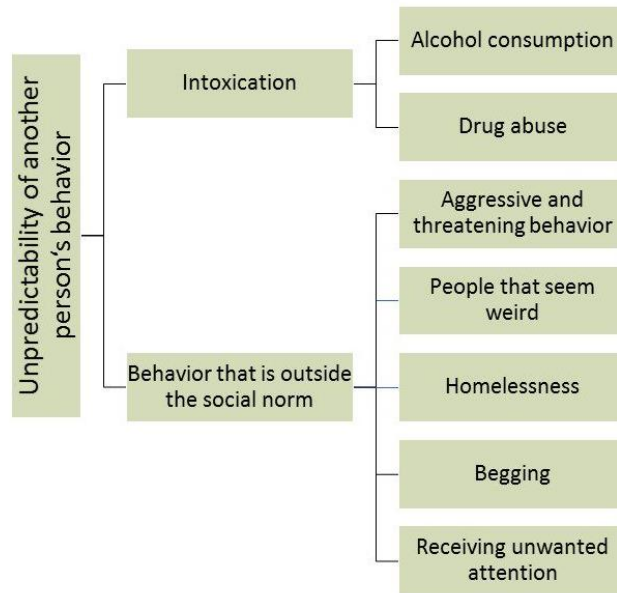


Figure 21 Hierarchy of reasons for unpredictable behavior

The second main factor that can be drawn from the survey and interview answers is the *Absence of other people*. In the survey participants stated that they feel safe or mostly safe at very busy stations, among the free text field answers station personnel was mentioned as increasing the feeling of safety. During the interviews participants mentioned that they feel less safe when there are only a few people around. This was explained by the participants with the perception that no one would help them if a threatening situation occurred.

Another response that could be found among the survey answers as well as the interview responses refers to presence of only men, or in other words the absence of other women. Combined with the interview finding that persons who were responsible for a reduced feeling of safety were solely men, it can be said that men are perceived as more threatening than women. *Men* are therefore the third main factor that influences the participants perception of safety.

5.3 Comparison of the physical and social environment

The physical and social factors of the environment impact the participants perception of their personal safety differently. This section will compare the three main factors of both branches that were established in the sections before. [Figure 22](#) shows these six factors that are deemed as most influential on the participants feeling of safety.

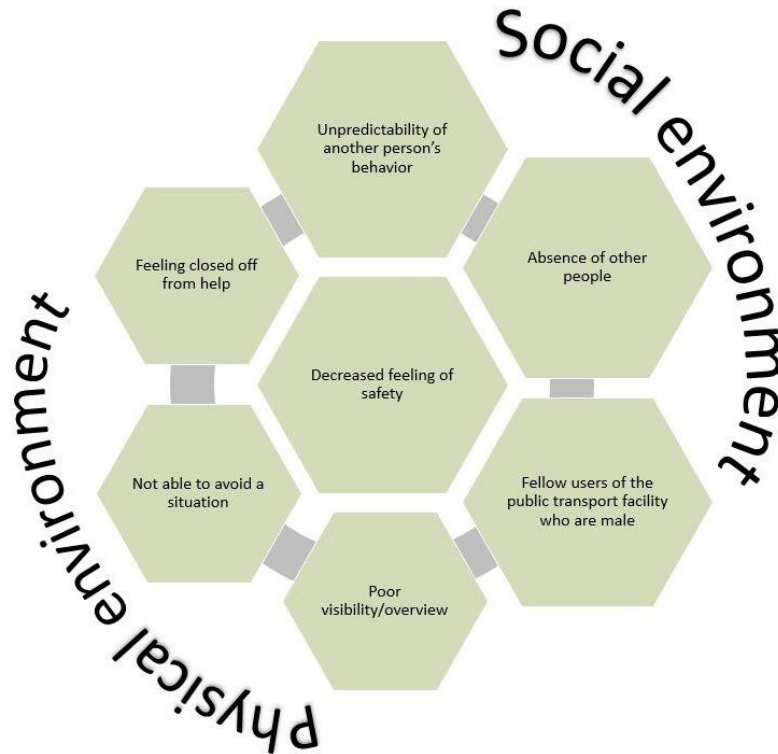


Figure 22 Main factors of the physical and social environment influencing the perception of safety

Although physical and social factors influence how safe the participants feel, the degree to which they do so differs a lot. Two main assumptions can be made about the impact of these factors. The first one is that social factors weigh stronger on the participants perception of safety than physical factors, and the second one is that it is the combination of factors that leads to the participants perception of reduced personal safety.

The survey ratings and the responses given in the interviews indicate that social factors weigh stronger than physical factors. The factors stemming from the social environment received higher ratings and were mentioned more often during the interviews. The highest average rating that a physical factor received in the survey was 4.48 stars (out of 5), meaning that it influences the participants perception of safety to the point where feelings of fear can arise. This average was given to the factor “bad lighting”. The other three factors were rated below an average of 3.3 stars. Among the four factors of the social environment, three were rated with an average above 3.4 stars. The highest rating was given to unpredictable behavior from groups (average of 4.81 stars) and unpredictable behavior from individuals (average of 4.57 stars). [Figure 23](#) gives an overview of the aforementioned social and physical factors.

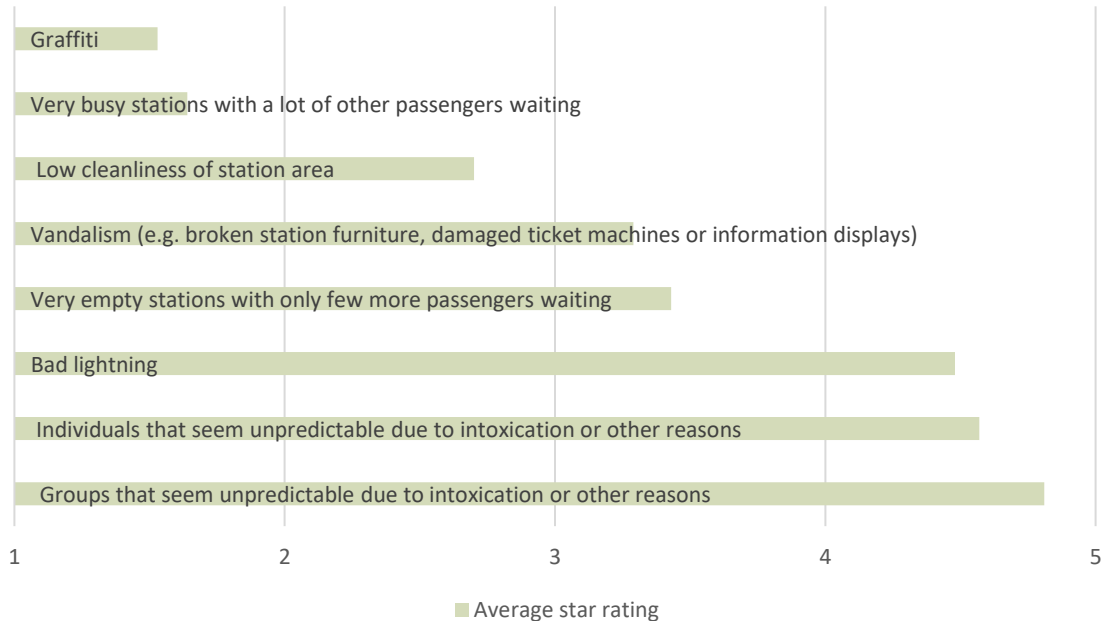


Figure 23 Overview rating of social and physical factors

Among the free text field answers participants gave four and five stars to the factors that influence how good the surroundings can be overseen, e.g. narrow passages, poor overview of the station, and only one exit/entry. The free text field answers relating to the social environment that were rated with four and five stars, included those that refer to a person's behavior outside the social norm, e.g. homelessness, loud people, and those that refer to men, e.g. groups of men, no other women present.

The coding of the interviews showed that more references were made to factors of the social environment than those of the physical environment. While all interview participants mentioned factors from the social as well as from the physical environment, the total references made to factors of the social environment was double to those of the physical (50 compared to 25). The different sub-factors of the physical environment mentioned by interviewees (see [Table 6](#)) received a frequency count of three in one case and one or two in all other cases. This means that a maximum of three out of ten interview participants mentioned the exact same sub-factor. The different sub-factors of the social environment (see [Table 9](#)) received a frequency count of nine in two cases, six in one case, five in three cases, and less than five in all other cases. This shows that there is higher agreement among the participants among the influence of the social environment on their perception of personal safety.

Another indicator for the social environment weighing stronger than the physical environment are the situations described by interviewees that were perceived as threatening. In only three out of the 14 situations that were described, did participants specifically mention their physical environment as contributing to their reduced feeling of safety. In one case the participant mentioned that the layout of the station was very confusing, and she didn't know which exit to take, in the other two cases the participant was on the train and could not escape the situation. However, in both cases the mentioned physical environment was not the cause for feeling unsafe but an intensifier. In all other situations described the participants made another person's behavior responsible for feeling of reduced safety.

Even though the survey and interview answers show that the social environment has a stronger influence on the perception of safety than the physical environment, it is not possible to determine the hierarchy within these factors, as it would be necessary to investigate them separately. This brings about the second main statement which is the interconnectivity of the factors. To explain this, it is best to look at the situations that participants described as threatening. Table 10 summarizes the factors mentioned in each situation.

Table 10 Summary of factors that were mentioned by interviewees as contributing to a reduced feeling of safety in certain situations

Situation	Factors mentioned
1	Absence of other people: only few other passengers Men: only men around Unpredictability of another person's behavior: feeling stared at and followed Poor visibility/overview: confusing station layout, not clear which exit to take
2	Unpredictability of another person's behavior: person acting aggressive Men: person was male
3	Unpredictability of another person's behavior: Person acting weird Men: person was male Not able to avoid situation: Being on the train
4	Unpredictability of another person's behavior: person drinking alcohol Men: person was male

5	<p>Unpredictability of another person's behavior: Participant received unwanted attention</p> <p>Men: person was male</p>
6	<p>Unpredictability of another person's behavior: person acting aggressive</p> <p>Men: person was male</p>
7	<p>Unpredictability of another person's behavior: person acting aggressive</p> <p>Men: person was male</p>
8	<p>Unpredictability of another person's behavior: person acting aggressive</p> <p>Men: person was male</p>
9	<p>Unpredictability of another person's behavior: person drinking alcohol, harassing other passengers</p> <p>Men: person was male</p> <p>Absence of other people: only few other people around</p>
10	<p>Unpredictability of another person's behavior: person drinking alcohol, harassing other passengers</p> <p>Men: person was male</p>
11	<p>Unpredictability of another person's behavior: Participant felt stared at</p> <p>Men: person was male</p> <p>Absence of other people: participant was alone with the person</p>
12	<p>Unpredictability of another person's behavior: Person acting aggressively</p> <p>Men: person was male</p> <p>Not able to avoid situation: Being on the train</p>
13	<p>Unpredictability of another person's behavior: Group pf people drinking alcohol, acting loud and seem aggressive</p> <p>Men: person was male</p> <p>Not able to avoid situation: Being on the train</p>
14	<p>Unpredictability of another person's behavior: Person acting aggressively, was intoxicated</p> <p>Men: person was male</p>

In no situation was one single factor responsible for the participants feeling of unsafety. In most cases two factors were mentioned, and in some cases three or even four were mentioned. It is very likely that more than the mentioned factors influenced the situation, but participants did not disclose them in the interviews. However, this shows that there are links between the different factors and that it is the combination of at least two factors that leads the participants to be concerned about their personal safety.

The comparison of the social and physical factors that were investigated in this study suggest that it is the combination of social and physical factors that lead to the participants feeling of reduced safety but the social factors are decisive for the level of feelings of unsafety that are experienced by the participants. For example the combination of a station with a very poor overview of the station and bad lightning with only very few other passengers around will be perceived as less safe than a station with a very poor overview of the stations and bad lightning combined with a lot of other passengers around. Therefore, social factors are considered superordinate to the physical factors.

5.4 Familiarity and image of a station and the surrounding area

This section will present the results and findings that contribute to the question of the influence of familiarity with an area and the image of an area surrounding a train station. Survey answers and interview responses suggest that a link between familiarity of an area and the perception of safety exists, as does the between the image of the surrounding area and the perception of safety. The image of an area is the general public's view of that area which is informed by knowledge gained from news stories and reports, hearsay, or stigmas but also from personal experiences. It is often areas with low employment rates, low education, low income and higher crime rates compared to other areas, that receive a bad image.

Survey answers

In the survey participants were asked to rate the following factors relating to their familiarity with a station/area according to how it impacts their feeling of safety. One star is given for low impact, meaning the person feels safe, and five stars are given for high impact, meaning that feelings of fear can arise. In addition, participants were able to add and rate their own answers in an open text field.

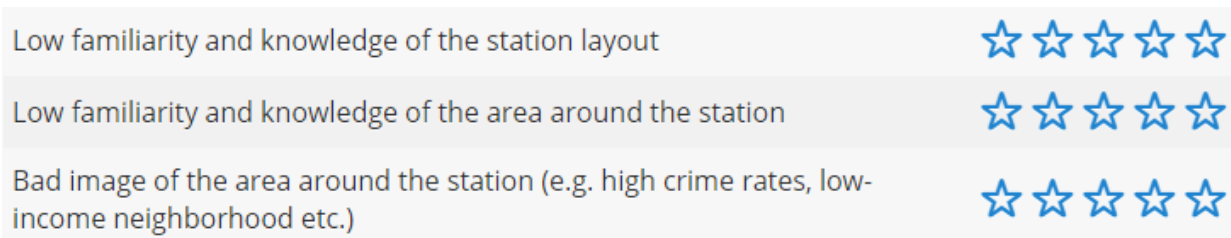


Figure 24 Factors related to familiarity and image of an area to be rated by survey participants

The first two factors have a medium impact on the participants perception of safety with an average of 2.78 for low familiarity and knowledge of the station area and 3.13 for low familiarity and knowledge of the area around the station. The second factor received a slightly higher average rating which means that a lack of knowledge of the surrounding area has a slightly higher impact on the participants perception of safety than low familiarity with a specific station. A bad image of the area around the station received the highest average rating among those three factors, with 3.38 stars. [Table 11](#) shows the frequency count for each answer and the average star rating the factors received.

[Table 11](#) Average star rating of factors relating to familiarity rated by the survey participants

Factor	Average rating
Low familiarity and knowledge of the station layout	2.78
Low familiarity and knowledge of the area around the station	3.13
Bad image of the area around the station (e.g. high crime rates, low-income neighborhood etc.)	3.38

In all cases participants rated their feeling of safety from one to five stars, meaning that some participants have no safety concerns at all while others experience feelings of fear. [Figure 25](#) illustrates the percentages given for the factors relating to familiarity and image of an area. Low familiarity with the station and low familiarity with the area around the station peak at three stars which means that the participant’s perception of safety is somewhat impacted by low familiarity, yet not very strongly. The range of stars given to these two factor indicate that a person’s familiarity with the station layout and familiarity with the area around the station may have a tendency to make them feel less safe but individual experiences and characteristics may also play an important role. The factor “bad image of the area around a station” peaks at five stars, followed by three stars and four stars. This shows that a general tendency among the participants

exists to feel somewhat unsafe or very unsafe when the station is located in an area that holds a bad image.

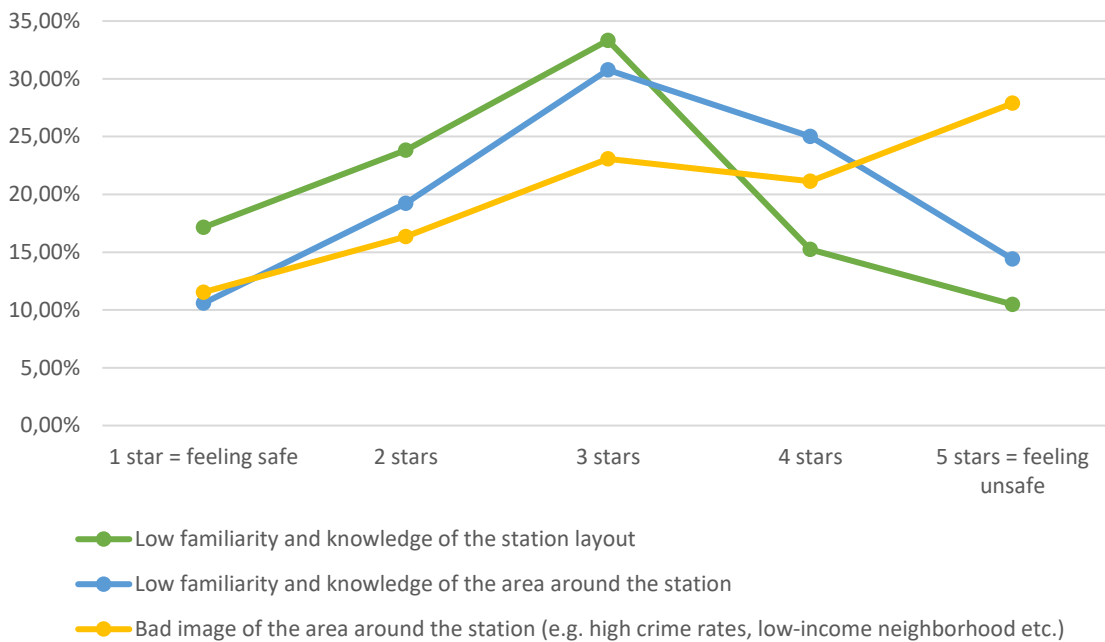


Figure 25 Percentage of survey responses on familiarity and image of an area

None of the open text-field answers given by participants relate to the familiarity or image of the station or the surrounding area.

Another question in the survey asked participants to name their home station, the one that is closest to their home and that they use most frequently, and rate how safe they feel at that station during the night. The rating scale for this question was from 1 to 5, with 1 being very unsafe (feelings of fear can arise, the station will be avoided if possible) and 5 being very safe (no safety concerns). The average rating for the home station is 3.17. The frequency count for the individual values is summarized in Table 12. The frequency count shows that more participants feel very safe (5) than very unsafe (1) when using their home station at night. A moderate feeling of safety (3) received the highest share with 31.7% and the two intermediate steps (2 and 4) received a very similar share with 22.8% (2) and 23.8% (4). It is assumed that participants are familiar with their home station, i.e. they know the stations layout, and which exits they need to take to get to a specific point on street level. The range of answers given to this question indicated that just familiarity with a station does not lead to the station being perceived as very

safe or safe. It suggests that other factors and individual characteristics and experiences may play a more important role for this case.

Table 12 Frequency count "How safe do you feel at your home station at night"

How safe do you feel at your home station at night?	Count	Percentage
1 = very unsafe	7	6.93%
2	23	22.77%
3	32	31.68%
4	24	23.76%
5 = very safe	15	14.85%
Total	101	100%

Survey participants were also asked to name stations that they would try to avoid after dark (8pm – 6am) and stations at which they feel safe after dark. Not all of the 106 participants answered these two questions. A blank answer will be counted as “none”, meaning that the participant does not have a specific station she tries to avoid or feels safe at after dark. Among the stations they would try to avoid after dark the highest share was accounted for “none” with 20 participants stating that there is no station they would avoid. Although 18.8 % of all participants do not avoid any particular stations, 81.2% of all participants did name very specific stations. Among those, some stations were named more often than others. The stations that were named six times and more can be seen in [Figure 26](#).

The results show that the stations Kottbusser Tor and Alexanderplatz are mentioned most often, shortly followed by Hermannplatz. All six stations are located in areas that rate high in social inequality (Pohlan, 2019) and have higher crime rates (Berlin, 2020). This suggests that stations that are located in areas which have a bad image, are more likely to be avoided.

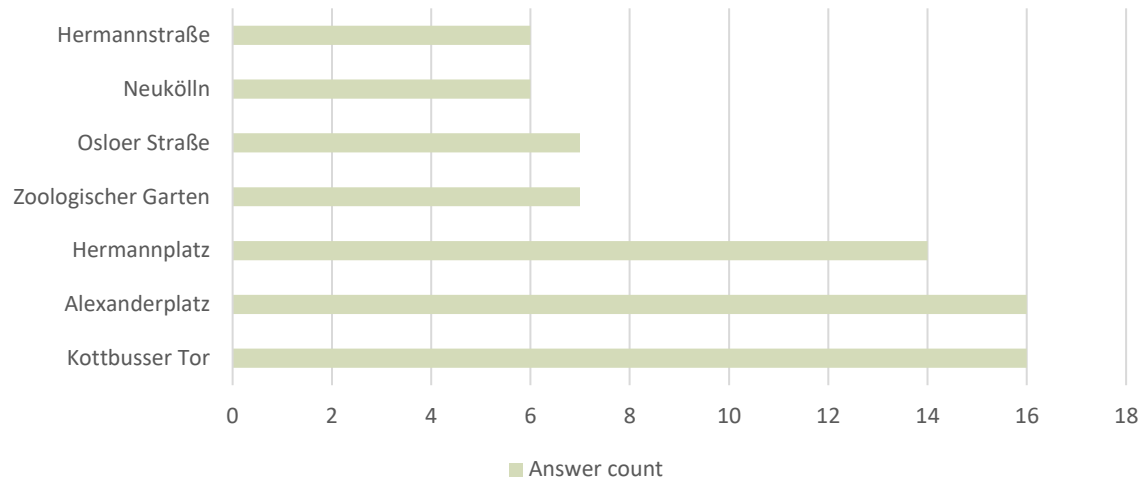


Figure 26 Answer count for stations participants try to avoid at night

Among the stations that participants feel safe at after dark, the highest share can be counted for “none” with 52.8% of all participants stating that such a station doesn’t exist for them. The stations that were mentioned most frequently by participants can be seen in [Figure 27](#). The station that was mentioned most often is Friedrichstraße with seven counts, followed by Potsdamer Platz, Kurfürstendamm, Hauptbahnhof, Brandenburger Tor, and Alexanderplatz with three counts each. Alexanderplatz has been mentioned as a station participants perceive as safe at night as well as a station participants try to avoid at night. This indicates that individual characteristics and experiences play an important role too. Five of the six station that were mentioned most often as perceived as safe at night, are located in the same area in the city center, and one is a little bit further out. These stations are also located in areas that show high crime rates (Berlin, 2020). The fact that more than half of all participants stated that a station at which they feel safe at after dark doesn’t exist indicates that participants are more likely to not feel safe in general when they travel by train at night. An overview with the location of the stations can be seen in [Figure 28](#). In both categories, stations avoided at night and stations perceived as safe at night, the named stations are from various size and layout, and hold different physical and social environmental factors, that were mentioned in the previous section.

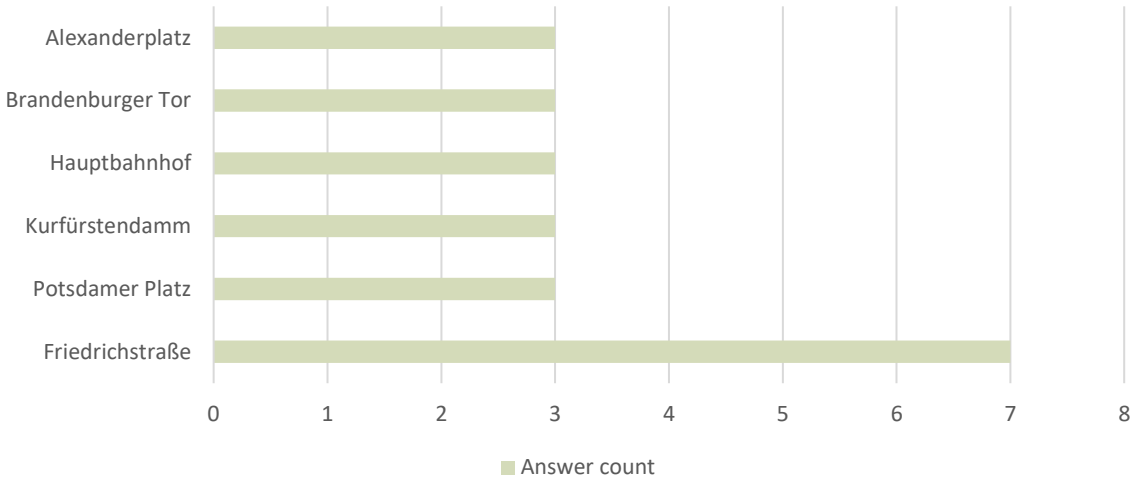


Figure 27 Answer count for stations participants perceive as safe at night

Zoologischer Garten, Alexanderplatz, Hauptbahnhof, Potsdamer Platz and Friedrichstraße are bigger stations that serve S-Bahn, U-Bahn, and regional trains. Herrmanstraße, Neukölln, Osloer Straße, Hermannplatz, Kottbusser Tor, and Brandenburger Tor have two lines connecting, and Kurfüstendamm serves only one line. Yet, putting these stations on a map shows geographical clustering of stations that are perceived as safe or not safe (see [Figure 28](#)).

In the following map, the stations that were mentioned beforehand are indicated with a train-icon, and stations that were also mentioned by participants, but not as often are indicated with a dot. Red pins indicate the stations that participants try to avoid at night while green pins indicate the stations that participants perceive as safe at night. The colored key refers to the total crimes of bodily injury per 100.000 residents in 2019 in Berlin. With dark red being the highest of more than 1.800 per 100.000 residents and beige being the lowest with less than 600 per 100.000 residents. The blue areas do not display any crime rates as they are not relevant for this case. The crime rates of bodily injury were chosen here as this is the biggest share of crime reported on public transport that directly effects the passenger. The other substantial amounts of crime on public transport are theft (pickpocketing) which usually happens without the victim noticing it, and property damage that is done to the station property.

The map shows that the stations appear in clusters which illustrates that certain areas of the city are perceived as less safe than others. Comparing this to the actual crime rates which are displayed by color, shows a correlation between areas with higher crime rates and stations that

participants try to avoid at night. Most significant is the stretch of stations that starts in Kreuzberg with the station Kottbusser Tor and reaches south to Neukölln where it ends at the station Hermannstraße. It is indicated with a black circle on the map. That areas of Kreuzberg and Neukölln holds an especially bad image as low-income, high-crime area (Keller, 2015) and is ranked very high in social inequality according to the monitoring report “Soziale Stadtentwicklung” (Pohlan, 2019). The same applies for the cluster of five pins in the north, which are located in the district Wedding. The area shows high crime rates and is ranked very high in social inequality (Pohlan, 2019).

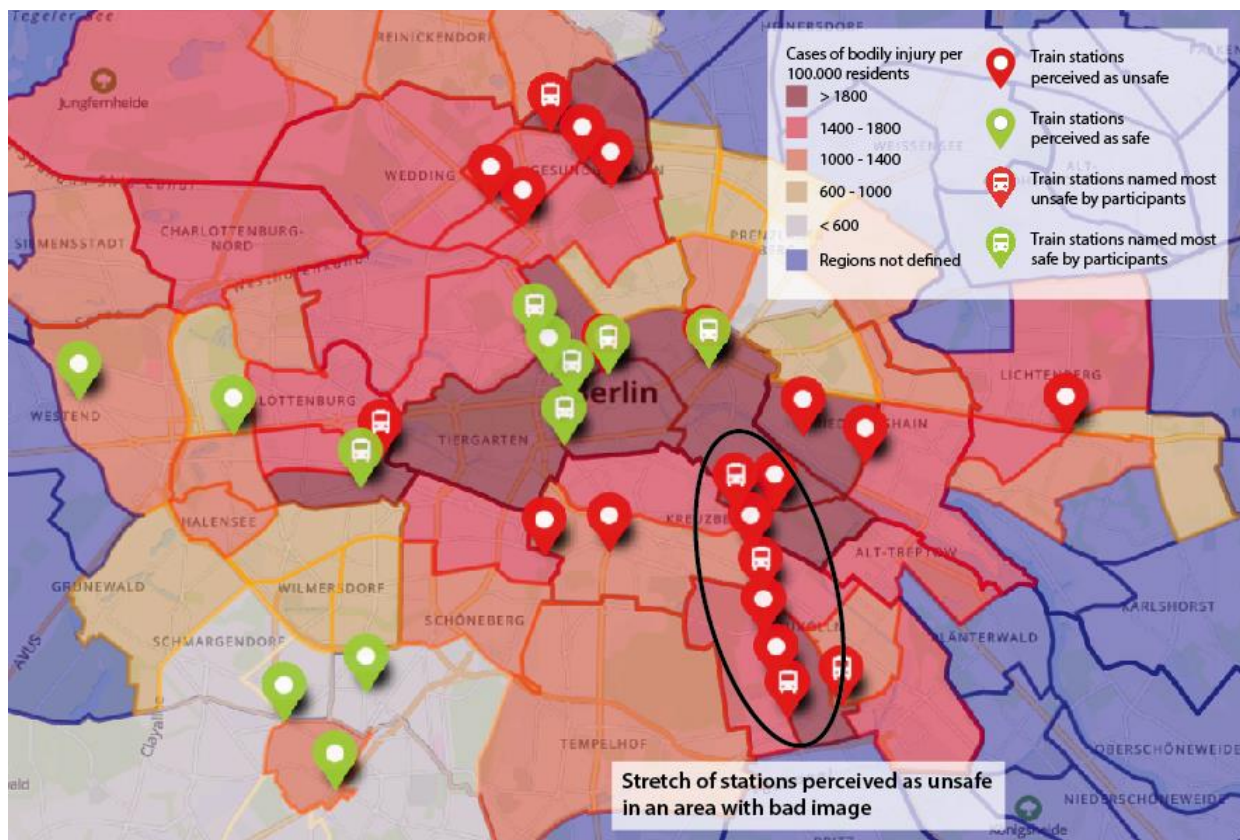


Figure 28 Map indicating crime rates and stations perceived as safe and unsafe at night

Another link can be made to areas with a high number of drug related crimes. As it was shown in the previous section, survey and interview participants expressed that people whose behavior seems unpredictable due to intoxication have a significant influence on their perception of safety. The stations Kottbusser Tor and Görlitzer Bahnhof, which have been named by participants as stations they would avoid, are located in the area with the highest number of drug-related crimes

in Berlin (Berlin, 2020). This suggests that participants avoid stations in areas that are associated with the drug-scene and where it is hence more likely to come across intoxicated persons.

Two clusters of stations that participants perceive as safe at night can be identified. One is located in the south, in the districts Steglitz and Schöneberg, and the other one in the city center, in the district Mitte. The area in the south shows very low crime rates and is ranked middle and low for social inequality (Pohlan, 2019).

The more interesting cluster, however, is the one in the city center. This area holds very high crime rates but is ranked middle and low in social inequality (Pohlan, 2019). Big parts of this area are not residential as the government district and many businesses are located there, as well as the big city park Tiergarten. It is a very busy area with many tourist attractions and shopping opportunities. The fact that participants perceive these stations as safe, despite the high crime rates, suggests that the image of an area and its social structure play a more important role for the perception of safety than actual crime rates. It also shows that the perception of crime and actual crime rates are not always coherent.

Interview responses

In the interviews, participants linked their perception of safety to their familiarity with an area and their “being used to” certain aspects of it. Six out of 10 interview participants brought up familiarity as a factor that gives them more confidence and feeling of safety while using public transport. The statements participants made can be put into sub-categories of familiarity. These sub-categories are *being used to*, *frequency of use*, and *positive connotation with the station or area*.

Being used to was brought up by two participants in their 50s who had grown up in Berlin and lived there for most of their life. They described “things don’t shock me that easily, I am used to a lot of special situation” and that they perceive it as normal to come across homeless people, beggars, or very unkempt station areas. The category of “being used to” is supported by an experience describe by one participant who had moved to Berlin for her studies. She described how overwhelmed she felt with the transport system and seeing homeless people, beggars, and people doing drugs at train stations made her feel very uncomfortable and less safe.

The second sub-category of *frequency of use* assumes that a person has good knowledge of an area when her or she spends a lot of time there. This sub-category is supported by all of the six participants stating that they feel more comfortable and at ease at stations or lines that they use a

lot. Three participants mentioned that they feel safe at their home-station as they use that a lot and know the station and the surrounding area very well. Another participant says that she prefers to “take routes that I know very well when I travel home at night”, and two more point out that she feels less safe in areas and stations she is not familiar with, “when a station has many exits and I don’t know which direction to go”.

The last sub-category *positive connotation with the station or area* suggests that a person feels safer in areas that they have a positive connection to. One participant in particular mentioned that it gives her comfort when a station has a meaning like “this is where my dentist is or this is where my grandad lives”.

Out of the three sub-categories, the second one *frequency of use* is the most significant as it was mentioned by all six interviewees who talked about familiarity as a factor that influences their perception of safety.

During the interviews, participants were also asked whether they have certain areas or stations in the city they would avoid if they could. In addition to the factors of the social and physical environment, participants made relations to the image of the station or surrounding area. Five participants named very specific stations and four made a more general statement about areas they would avoid. The stations that were named by participants are Görlitzer Bahnhof, Kottbusser Tor, Schlesisches Tor, Hermannstraße, Zoologischer Garten and Nollendorf Platz, while three participants named the Görlitzer Bahnhof. Their main reason for avoiding that station is a high presence of intoxicated people in that area and its publicity for drug abuse. Participants that made more general statements mentioned that they would avoid areas that are known for certain groups of people to hang out there, which are homeless people, drug addicts, and lots of drunk people after partying.

5.4.1 Summary of survey and interview responses

The results and findings of this section show that familiarity and image of an area contribute to the perception of safety but to a lower degree than the environmental factors which were presented in the section before. The survey and interview answers for this section show a lot of parallels.

Familiarity with a station and its surrounding area influences the perception of safety positively in the sense that participants feel more confident and at comfort at stations that they know well.

Yet, the fact that it was brought up by only six out of ten interviewees and the average rating being around three stars (out of five on the safety scale) suggests that its impact is moderate and not decisive.

It appears that the image of the area surrounding a train station has a slightly bigger impact than the familiarity. The survey rating of “bad image of the area around the station” gave an average of 3.38 stars, with 27,9 % participants giving 5 stars (feelings of fear can arise). The location of stations that both survey and interview participants would try to avoid at night shows very clearly that these stations cluster in areas that hold high crime rates, especially drug-related crime, and score high on social inequality. The location of stations that participants perceive as safe show that the image of an area based on its socio-economic background, which is displayed in the social inequality ranking, weigh higher than the actual crime rates in that area.

5.5 Summary of results and findings

The results and findings of this research are based on a survey with 106 respondents and 10 interviews. All participants were female and live, study or work in Berlin. The results and findings have been structured in three main topics which are Women on public transport, Factors that influence the perception of safety, and Familiarity and image of a station and the surrounding area.

The first topic gave an overall image of how women in Berlin use public transport and which attitude they hold towards public transport. The main findings of this section are:

- Public transport is used for a variety of purposes by the participants, e.g. commuting to school or work, visiting friends and family, attending appointments,
- Participants living in the city center prefer public transport as mode of transportation and use it more regularly than participants who live on the outskirts of the city,
- participants who use public transport on a daily basis express a more positive attitude towards public transport in general,
- more than 50% of survey and interview participants stated to avoid certain stations or areas, especially at night, by taking detours or changing to a different mode of transportation.

The second topic investigates factors that stem from the physical and social environment. The physical environment includes the design of a station in general, e.g. whether it is narrow or wide, as well as more specific features, e.g. the lighting or cleanliness. It also includes damages that have been done to the built environment, e.g. graffiti or vandalism. The social environment includes factors that stem from the surrounding people or have to do with other people in general. It can be the absence or presence of other people as well as the behavior of another person the public transport facility is shared with. The main results and findings of this section are:

- Three main factors of the physical environment
 - Feeling closed off from help through station design,
 - Not able to avoid a situation, due to narrow spaces, limited exit opportunities etc.,
 - Poor visibility/overview of the station area, due to confusing station layout, bad lighting, no signs indicating exit etc.
- Three main factors of the social environment
 - Unpredictability of another person's behavior, due to intoxication etc.,
 - Absence of other people,
 - Men.
- Social environment has a stronger impact on the participants perception of safety than physical environment,
- Factors are interconnected, it is always a combination of at least two factors that leads to the participants reduced feeling of safety.

The third topic investigated the role of familiarity and image of a station and its surrounding area. The main results and findings of this section are:

- Familiarity has a moderate yet not decisive influence on the participants perception of safety, participants feel more confident and at comfort at stations that they know well

- The image of an area has a stronger impact on the participants perception of safety than the familiarity, participants avoid stations that are located in areas which hold a bad image
- Especially areas that are associated with the drug-scene are avoided by participants.

The results and findings show that many variables influence the perception of personal safety. The importance of each variable and how this knowledge can be used to provide public transport that all users feel safe using, will be discussed in Chapter 6 Discussion.

6 Discussion

The results and findings show that safety, i.e. feeling safe from victimization through crime, is a topic that concerns the majority of female public transport users who were part of this study, and is therefore a relevant issue that needs to be tackled by public transport operators, as well as planners and other relevant decision-making authorities. As the Theory of planned behavior suggested, female public transport users engage in avoidance behavior when they experience feelings of unsafety. Among the research participants, more than 50% stated they avoid certain underground stations or areas, especially at night due to feeling unsafe. This avoidance is carried out by taking detours or switching to a different mode of transportation, e.g. a private car, taxi, or bus instead of underground trains. Participants who deliberately avoid certain stations act according to the concept of danger control to deal with fear arousal (Ruiter et al., 2001). Some participants stated that they do not feel safe using certain stations at night but travel through them anyway because of convenience or limited alternatives. These participants act according to the concept of fear control, by dealing with their emotional state rather than avoiding the fear arousing threat (Ruiter et al., 2001). The confirmation of the concepts that can explain female public transport user's behavior supports the reality of the issue.

The influence the environment has on female's perception of safety has been the main focus of this study and the results and findings show that especially the social environment impacts the participants perception of safety. This finding is evident in other literature as well (LaGrange et al., 1992). The findings show that factors that the most influential factors from the physical environment on the participants perception of safety are 'Feeling closed off from help through station design', 'Not able to avoid the situation, due to narrow spaces, limited exit opportunities etc.', and 'Poor visibility/overview of the station area, due to confusing station layout, bad lighting, no signs indicating exit etc.'. These findings confirm the Prospect-refuge theory which states that people feel safe in spaces which are open (prospect) and offer possibilities to seek help or hide at the same time (refuge). The first finding 'Feeling closed off from help through station design' directly addresses the point of 'seeking help'. The explanation provided by participants was that underground stations are closed off from the activities going on at street level and therefore further away from potential help. Participants mentioned that the lack of fresh air in underground stations may increase this perception of being closed off. Another example were long and narrow passages that offer no exit mid-way. Although these spaces might provide a

good overview within the space, the isolation from the world surrounding the space is perceived as a lack of possibilities to seek help by the participants.

The second finding 'not being able to avoid a situation' relates to the point of being able to hide or seek refuge from a situation that is perceived as threatening. Participants especially associated this especially to very narrow platform that don't allow them to take a safe distance from the situation, or to being on the train and therefore not able to leave the situation.

The third finding 'Poor visibility/overview of the station area' is connected to the aspect of open spaces that are clear and easy to understand and hence offer the possibility to detect threats early. The example and explanations given by participants for this finding include bad lighting, very big stations, confusing station layouts, and stations with many exits, as all these factors contribute to bad orientation in the station. In a threatening situation this can add additional stress to public transport user as their escape route may not be clear.

Physical incivilities, e.g. graffiti, vandalism, trash, are also part of the physical environment. Yet, the findings suggest that these play a minor role in the influence on female public transport user's personal safety. Although, participants mentioned these incivilities make a station less welcoming, their overall impact on the participant's feeling of safety was rated low.

The findings regarding the physical environment also suggest that certain station designs can mitigate feelings of unsafety. The main elements of a safe station, with regard to the participants answers, should be a spacious platform with good lighting and clear directions provided by a clear overview and information signs.

The social environment consists of the people the space is shared with. The findings show that factors that stem from the social environment and have the strongest influence on the participant's feeling of safety are 'Unpredictability of another person's behavior', 'Absence of other people' and 'Men'.

The first finding 'Unpredictability of another person's behavior' has the strongest impact among all factors on the participant's feeling of safety while using public transport. It confirms the propositions made by the Disorder theory, that certain behaviors that don't seem to fit into a functional society or public order are perceived as unpredictable and therefore threatening (LaGrange et al., 1992). The most frequent example of unpredictable behavior given by participants was intoxication, meaning that the other person was either drunk or on some other

drugs, which affects their accountability and makes them less trustworthy to act lawfully. Another example was aggressive and threatening behavior which was often connected to intoxication, but not always.

The second finding ‘Absence of other people’ showed the participants were more likely to feel unsafe at very empty stations where there were only a few other passengers around, while in comparison they felt safer at a busy station. This finding relates to the concept ‘Eyes on the street’ which states that increased street activity decreases the risk of crime (Wekerle, 2000). Although the concept is defined for street-level spaces, the findings show that is also applicable to underground train stations. Even though it cannot be determined whether the risk of crime is actually reduced at busy stations, participants still perceive a reduced risk of crime as they feel safer when more people are around.

The third finding ‘men’ is not supported by any of the theories and concepts that provide an understanding of how the environment influences a person’s perception of safety. This finding might be subject to the gender of the study sample and their individual backgrounds. As outlined in the first part of the theory chapter, individual characteristics which include gender, play an important role for the perceived safety (Ajzen, 1991, Braungart et al., 1980). Women usually perceive themselves as less strong compared to men and therefore less able to defend themselves against a physical attack. Furthermore, women are especially worried about sexual crimes that may target women more than men while the offender is a man in most cases. Although sex-related crimes are the least common crime on public transport, it is the one that women fear the most when using public spaces which public transport is a part of (Stanko, 1995).

Besides the individual analysis of the different factors, the findings showed that a high inter-connectivity between the different factors is likely. The personal experiences of situations that created feelings of unsafety among the participants showed that it was always the connection of at least two factors that caused a perception of reduced safety. This high inter-connectivity of different factors influencing female user’s perception of safety outlines the complexity of the issue and its potential solutions.

The other two factors that were investigated in this study were the familiarity of a station or area and the image of an area. The results show that familiarity has a moderate yet not decisive influence on the participants perception of safety. Participants tend to feel more confident and comfortable at stations they know well as it easy for them to navigate through that space. This

connects to the Prospect-refuge theory as a person who is very familiar with a space has the overview (prospect) and knows where to seek help or hide (refuge). Thus, familiarity can replace a good station design and layout to provide female users with a sense of comfort and thereby reduce feelings of unsafety. Yet, planners and operators shouldn't rely on the user's familiarity to feel safe in a station. Good overview and way leading in a station design is necessary to provide all users whether they are familiar with the area or not, with the necessary information to feel comfortable. Furthermore, the study responses show that familiarity doesn't necessarily result in a feeling of safety, as participants rated their perception of safety at their home station with an average of 3.17 on a scale of one to five, where one is very unsafe and five is very safe. This indicates that other factors weigh stronger with the perception of safety than just a user's familiarity with the station and the surrounding area.

The study responses show that the image of an area has a stronger impact on the participants perception of safety than the familiarity as participants tend to avoid stations that are located in areas that have a bad image. This finding supports the suggestions that was made by Cozens and Van der Linde (2015) about the influence of the local environment surrounding each stations. In their study two train stations in Perth, Australia, were compared regarding to user's perception of safety of which one was designed according to the principles of Crime prevention through environmental design and the other wasn't. Participants perceived the station that wasn't designed according to CPTED as safer. These findings show that train stations can't be treated as a closed unit to reduce user's perception of unsafety. The surrounding area might further influence whether a user feels safe to get off at that station, alongside the characteristics of other user's the facility is shared with.

The results and findings outlined here show that women's perception of safety is an issue that is influenced by many different factors, coming from a variety of sources. It is not solely the stations and their design and layout that influences the female public transport user's feeling of safety, but also the people the facility is shared with and the area surrounding the station. Crime prevention through environmental design attempts to address the issue of crime and fear of crime from different direction. How and if these design principles can solve the issue of female public transport user's perception of safety is discussed in the following.

6.1 Can CPTED solve the issue?

One solution to address the issue of a perceived lack of safety in public spaces is the concept of Crime prevention through environmental design (CPTED) which was introduced in the theory chapter of this thesis. CPTED can be applied to public transport facilities as it is to other public spaces. It suggests that criminal behavior is a product of environmental conditions and can therefore be addressed through urban planning and design, as well as policies among others. A space that is designed to reduce crime should at the same time be perceived as safe by the users of the space. The main topics that CPTED focuses on are Territoriality, Surveillance, Access Control, Target Hardening, Activity Support and Image Management. The topics that are relevant to this research are Territoriality, Surveillance, Access Control, Activity Support, and Image Management. Target Hardening is considered as non-relevant as it focuses on protecting the physical part of the public transport facilities, i.e. the station furniture, the public transport vehicle etc., while the focus of this research lies on the female user's perception of safety. Target hardening might prevent vandalism, but the findings from this research have shown that vandalism has a non-significant influence on the participants perception of safety.

In CPTED, territoriality relates to a sense of ownership and responsibility for the space by users and residents. It is difficult to create community ownership over train stations that are used by many people every day, who are not necessarily residents of the neighborhood. The results show that female public transport users do experience feelings of unsafety, especially when they travel at night. The main cause for these feelings of reduced safety are other users of the public transport facility whose behavior is unpredictable due to intoxication or other reasons. The most named factors to influence their perception of safety in this study were alcohol and drug consumption, aggressive and threatening behavior, and the absence of other people who could help if necessary. Although alcohol and drug consumption, as well as threatening behavior are not permitted in the public transport facilities (S-Bahn Berlin GmbH, 2016, BVG, 2020), most train station do not have permanent personnel that can enforce these rules. The lacking presence of personnel can be perceived as a lack of responsibility and sense of ownership on part of the public transport operators. Stations then quickly get neglected and turn into a 'no-mans land' where no rules seem to apply. Installing permanent station personnel does not only show presence and ownership on part of the public transport operator who can enforce user regulations and therefore prevent crimes, but also offer a reliable source for help to public transport users

who would like to seek it. A greater sense of responsibility by the public transport users could result in cleaner stations with less graffiti and vandalism. As it is commonly a very small group of users that is responsible for trash, graffiti, or vandalism it may be most useful to address them directly through campaigns or activities.

Surveillance in CPTED focuses on enhancing visibility through CCTV or other technologies as well as security personnel. The research findings of this study show that the presence of other public transport users leaves the participants with a feeling of safety while CCTV surveillance or other technologies were not mentioned by any interview participants and stated only twice by survey participants. This suggests that ‘human surveillance’ as described in the ‘eyes on the street concept’ is more effective to reduce women’s feelings of unsafety than technology. This surveillance can be carried out by fellow public transport users, trained security personnel, or other station staff. Loukaitou-Sideris and Fink (2009a) made the same observation when investigating how women’s safety needs differ from men’s and came to the result that CCTV cameras seem to offer little comfort to women.

Access control to public transport facilities is usually achieved by implementing gates at the entrance to the platform which can only be passed with a valid ticket. Train stations in Berlin do not have any form of access control. Although the user regulations of the BVG state that it is not allowed to linger in the station area without the intention to use the public transport services (BVG, 2020), stations are used as meeting areas by certain groups as there is no permanent station personnel enforcing the user regulations. The participants of this study have pointed out that these groups are often homeless people or people consuming drug and alcohol and that they may impact their perception of safety negatively. In that context the implementation of access controls can be considered as useful to mitigate the female user’s feeling of unsafety. The implementation of access controls has been a topic of political and public interest in the past years but has been considered as not expedient and unfeasible by the public transport operators. Besides the logistical issues of installing access controls to stations that don’t offer the required space and that are under heritage protection laws, the transport operators don’t believe that access controls are the right solution to tackle fare evasion and illegal lingering in the stations (Füllung, 2018, Abgeordnetenhaus Berlin, 2017). The implementation of access control also leads to the exclusion of people from stations that are thought of as public spaces and should therefore not have restricted access. Although lingering in the stations is not allowed, public

transport systems are often places where informal activities take place. Musicians use them to make money, poor and/or homeless people beg, try to sell things, or search the rubbish bins for useful waste, and the general public may use them as social meeting points. During wintertime many homeless people rely on public transport stations as a place to seek refuge from the cold weather. The general attitude of public transport operators and security personnel is to tolerate these people as long as they don't cause trouble and discomfort for the public transport users. Installing access control to the stations without providing alternative spaces for these people would not solve the issue but simply moves it to a different space.

Activity support in CPTED aims at increasing safe and legitimate activities in a space that is perceived as unsafe and relates to the 'eyes on the street' concept. The results show that especially quiet stations that have low activity are perceived as less safe. The idea to increase activity in these stations is aiming in the right direction but might be difficult to put into practice. First of all, the space that is perceived as unsafe by the participants of this study is either the station platform or the public transport vehicle. Both are only used by people who want to use the public transport service. There are no other valid reasons to enter these spaces. Increasing activity on the platform can therefore only be reached by increasing the number of people who want to use the service. The research has shown that participants feel less safe at night, often because of low activity at the stations. Motivating more people to travel by public transport at night in order to increase activity at the platforms seems like an unattainable goal. Activity could be increased in the area around the station by having shops, restaurants or other public attractions that are open late at night. However, late-night attractions can involve alcohol consumption and might therefore be contra productive in solving this issue. Activity support may be difficult to balance to achieve an increase in the female public transport user's perception of safety in Berlin.

Image management relates to the general maintenance of a space so that it looks cared for and supervised. This includes general cleanliness as well as the quick removal of graffiti and repair of vandalism. Participants of this study have mentioned that very dirty stations are less welcoming and therefore avoided when possible. Yet, the survey responses have shown that low cleanliness, graffiti, and vandalism have a non-significant influence on the participant's perception of safety. At the same time image management should be the result of territoriality. If a person or a group feels responsible for and ownership over a place it will be kept in good

condition. Image management itself cannot reduce the issue of female unsafety in Berlin's public transport system. Trains and stations get cleaned every day, very busy stations even several times a day, yet, some stations don't ever seem to be clean. A higher degree of cleanliness could be reached by creating a bigger sense of responsibility among the users, as was described under territoriality. This could aid in the user's positive perception towards stations.

Crime prevention through environmental design touches upon the right issues with its six topics of Territoriality, Surveillance, Access Control, Target Hardening, Activity Support and Image Management, yet its implementation is either not feasible or doesn't approach the issue from the right angle to mitigate the female public transport user's perception of personal safety in Berlin. Yet, parts of its principles could be developed further to fit the case of female safety on public transport in Berlin.

7 Conclusion

Public transport systems are a very important infrastructure component in modern cities and receive more and more attention in the face of climate change and the goal to reduce CO₂-emissions in many cities. To increase public transport ridership and its attractiveness, it is crucial that all users feel safe from victimization while using public transport systems. Research has shown that women perceive safety differently from men and are more likely to develop avoidance behavior when they experience a reduced feeling of safety (Hempel, 2011, Kim, 2019, Crime Concern, 2002, Loukaitou-Sideris and Fink, 2009b). Such avoidance behavior includes taking detours to avoid certain stations or areas, limiting their travels by public transport to certain times of the day, or switching to different mode of transport, e.g. cycling or the private car. The perception of safety is generally dependent on a person's personality and individual experiences and beliefs, as well as external factors that stem from the environment, the space surrounding a person (Ruiter et al., 2001, Loewen et al., 1993, Taylor and Shumaker, 1990). While individual factors are difficult to determine within the scope of a master's thesis, it is possible to investigate the environmental factors. Subsequently, this research investigates which environmental factors influence a woman's perception of safety while she is using the public transport system and to what extent they do so. Understanding what influences the perception of safety and how it does so, can help public transport operators, planners, architects and other authorities to develop strategies and take measure to increase the overall feeling of safety.

An intensive literature review was carried out in the beginning of this study to obtain an overview of previous research and gain an understanding of the topic of perceived safety on public transport. The results of the literature review outlined the complexity of the topic and led the decision to focus on the influence of environmental factors on the perception of safety. Interview and survey questions were developed based on the findings of the literature review, and both the interviews and the survey were carried out online.

The results and findings of this research show that women's perception of safety is an issue that is influenced by many different factors, coming from a variety of environmental sources. It is not solely the stations and their design and layout that influence the female public transport user's feeling of safety, but also the people the facility is shared with and the area surrounding the station. The people that the public transport facility is shared with have the biggest impact on the female user's perception of safety, whereas especially intoxicated people, homeless people, and

people whose behavior is outside the social norm contribute to a feeling of unsafety. Poor lighting, bad station overview, narrow spaces, and the absence of other passengers further contribute to a feeling of unsafety.

The results and findings of this study led to three major conclusions. The first conclusion is that safety on public transport is a topic that concerns many female public transport users in Berlin and impacts their travel behavior to a point where certain stations or areas are avoided out of fear of victimization especially at night. This avoidance behavior can be seen in the form of taking detours, switching to a different mode of transport or avoiding travel after dark. This highly limits female's travel habits and freedom of mobility and can in worst cases lead to social exclusion.

The second conclusion is that many factors of the social and physical environment seem to impact the female public transport user's perception of safety. It is evident that the social environment has a significant impact on the participants feeling of safety, whereas the physical environment was seen to have a moderate impact. The factor that influences the participants perception of safety the strongest are fellow users of the public transport facility whose behavior seems unpredictable due to intoxication or other reasons. Although the investigated factors weigh differently in their influence on the perception of safety, it seems that it is a combination of several factors that ultimately led to a feeling of unsafety among the participants.

The third conclusion is that the issue of female's perceived safety on public transport cannot be solved by physical interventions solely. The results and findings show that a combination of different factors and even the area surrounding the station influence the participants feeling of safety. It therefore needs a holistic approach based on physical and social interventions to tackle the presented problem. Crime prevention through environmental design touches upon the right topics but doesn't seem feasible to solve the issue in the case of Berlin. This shows that solutions need to be tailored to the specific case in order to be fruitful.

7.1 Limitations

Although the study on female public transport user's perception of safety in Berlin provided a good understanding of the factors that influence the participants perception of safety, several limitations were recognized during the research. The first limitation concerns the sample size. The survey received 106 responses, while interviews were carried out with 10 participants. The

number of women involved in the study combined with a potential self-selection bias to fill the online survey on ‘safety on public transport in Berlin’, the study does not allow for generalization across western cities and their female public transport users. Creating a questionnaire that is designed to be a general public transport survey rather than related to ‘personal safety’ can avoid the self-selection bias.

Another limitation regards the set-up and implementation of the survey and interviews. Some survey questions might not have been precise enough for the participants to fully understand what they were supposed to do, and questions were therefore left unanswered. The interviews could have been more in depth by asking more ‘why?’ and ‘how?’ questions to get to the bottom of the participants opinion or feeling. This limitation can be attributed to the researcher’s minimal experience of carrying out qualitative research at the beginning of this study.

It should be noted that the ongoing Covid-19 pandemic, which restricted travel and access to the study site, presented a limitation to the research as well. Due to this, the research had to be carried out remotely. This limited the access to participants and data, as well as the methods that were available for this research.

7.2 Recommendation for future research

Based on the results and findings of the study, there are several recommendations for future research. First, some of the limitations outlined in this study could be minimized or even eliminated in a revised implementation of the study. Conducting in-person research compared to remote research, allows for more methods to be used, especially observations, which can give additional data and a better understanding of the issue. It will allow for more precise solutions as well.

Another recommendation to expand on this research is to conduct an in-depth case study of stations that are perceived as least safe by the participants of this study to understand the dynamics that create this perception. This will allow for problem-oriented and holistic solutions that are tailored towards the specific case. In addition to this the study sample can be expanded to investigate female minor’s and elderly’s perception of safety on public transport.

As women are understood as more vulnerable and more likely to experience feelings of unsafety, most research has focused on women, while men’s perception of safety on public transport hasn’t received much attention so far.

8 References

- ABGEORDNETENHAUS BERLIN 2017. Schriftliche Anfrage zum Thema: Einrichtung von Zugangskontrollen zu Verkehrsmitteln der BVG. Berlin.
- AJZEN, I. 1991. *The theory of planned behavior*. Amsterdam.
- AJZEN, I. 2019. *Theory of Planned Behavior* [Online]. University of Massachusetts Amherst. Available: <https://people.umass.edu/aizen/tpb.html> [Accessed 20.03. 2021].
- BELL, P. A. 2001. *Environmental psychology*, New York, Psychology Press.
- BERLIN-BRANDENBURG, A. F. S. 2021. Einwohnerinnen und Einwohner im Land Berlin am 31. Dezember 2020. Potsdam.
- BERLIN, P. 2020. *Kriminalitätsatlas Berlin* [Online]. Available: <https://www.kriminalitaetsatlas.berlin.de/K-Atlas/atlas.html> [Accessed 15.05.2021].
- BERLINER VERKEHRSBETRIEBE 2019. Sicherheitsbericht der BVG.
- BERLINER VERKEHRSBETRIEBE. 2021. *BVG* [Online]. Available: bvg.de [Accessed 20.03.2021].
- BIECK, R. E. A. 2013. Wie sicher fühlen sich die Fahrgäste im öffentlichen Verkehr?
- BILSKY, W. 2003. Fear of crime, personal safety and wellbeing: A common frame of reference. *Much to do about crime*, 37-55.
- BRAUNGART, M. M., BRAUNGART, R. G. & HOYER, W. J. 1980. Age, Sex, and Social Factors in Fear of Crime. *Sociological Focus*, 13, 55-66.
- BVG. 2020. *Nutzungsordnung* [Online]. Available: <https://www.bvg.de/nutzungsordnung> [Accessed 17.06.21 2021].
- CAHILL, M. 2010. *Transport, Environment and Society*, Maidenhead, Maidenhead: McGraw-Hill Education.
- CENTER NAHVERKEHR BERLIN. 2021. *Zahlen und Fakten zum ÖPNV* [Online]. Available: <https://www.cnb-online.de/hintergruende/zahlen-und-fakten-zum-oepnv/> [Accessed 18.06.21 2021].
- CHOWDHURY, S. & VAN WEE, B. 2020. Examining women's perception of safety during waiting times at public transport terminals. *Transport policy*, 94, 102-108.
- COZENS, P. & HILLIER, D. 2012. Revisiting Jane Jacobs's 'Eyes on the Street' for the twenty-first century: Evidence from environmental criminology. *The urban wisdom of Jane Jacobs*, 196-214.

- COZENS, P. & LOVE, T. 2015. A Review and Current Status of Crime Prevention through Environmental Design (CPTED). *Journal of Planning Literature*, 30, 393-412.
- COZENS, P. & VAN DER LINDE, T. 2015. Perceptions of crime prevention through environmental design (CPTED) at Australian railway stations. *Journal of Public Transportation*, 18, 5.
- CRIME CONCERN 2002. People Perceptions of Personal Security and Their Concerns About Crime on Public Transport: Literature Review. London, UK: Department for Transport.
- D'ARBOIS DE JUBAINVILLE, H. & VANIER, C. 2017. Women's avoidance behaviours in public transport in the Ile-de-France region. *Crime prevention and community safety*, 19, 183-198.
- DELBOSC, A. & CURRIE, G. 2012. Modelling the causes and impacts of personal safety perceptions on public transport ridership. *Transport policy*, 24, 302-309.
- DER POLIZEIPRÄSIDENT IN BERLIN 2019. Kriminalität in Berlin Berlin.
- DEUTSCHLAND.DE. 2021. *Federal States of Germany* [Online]. Frankfurt am Main: FAZIT Communication GmbH. Available: <https://www.deutschland.de/en/topic/politics/germany-europe/federal-states> [Accessed 08.05.2021].
- FIEDLER, D. 2018. U-Bahnhof Residenzstraße. bahnbilder.de.
- FOLLMER, R. G., DANA. 2017. *Mobilität in Tabellen 2017* [Online]. Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR). Available: <https://mobilitaet-in-tabellen.dlr.de/mit/login.html?brd> [Accessed 18.06.2021 2021].
- FORSA. 2012. Sicherheitsempfinden in öffentlichen Verkehrsmitteln. Gesellschaft für Sozialforschung und statistische Analysen mbH.
- FÜLLING, T. 2018. Senat und BVG lehnen Zugangssperren an U-Bahnhöfen ab. *Berliner Morgenpost*.
- HAWLEY, S. 2021. What happened to Sarah Everard? The murder that triggered a global outpouring of grief and rage. *abc*.
- HEATH, Y. & GIFFORD, R. 2002. Extending the theory of planned behavior: Predicting the use of public transportation 1. *Journal of Applied Social Psychology*, 32, 2154-2189.

- HEMPEL, L. M., JANA; RAU, HEIKE; STELTNER, CLAUDIA; VEDDER, DAGNY 2011. Subjektive Sicherheit im Öffentlichen Personennahverkehr; Gemeinsamer Abschlussbericht 2011.
- HINE, J. & MITCHELL, F. 2003. *Transport Disadvantage and Social Exclusion: Exclusionary Mechanisms in Transport in Urban Scotland*, Florence, Florence: Routledge.
- INFROGRAFIK PRO 2021. Infografik Alexanderplatz.
- JACOBS, J. 1961. *The Death and Life of Great American Cities* (London: Jonathon Cope).
- JEFFERY, C. R. 1971. *Crime prevention through environmental design*, Sage publications Beverly Hills, CA.
- KELLER, C. 2015. Problemviertel? Imageproduktion und soziale Benachteiligung städtischer Quartiere. *bpb*.
- KIM, H. 2019. Service design for public transportation to address the issue of females' fear of crime. *Transportation*, 1-26.
- KURPJUWEIT, K. R., RONJA. 2018. Bahnhöfe brauchen mehr Personal - für höhere Sicherheit. *Tagesspiegel*, 04.04.2018.
- LAGRANGE, R. L., FERRARO, K. F. & SUPANCIC, M. 1992. Perceived risk and fear of crime: Role of social and physical incivilities. *Journal of research in crime and delinquency*, 29, 311-334.
- LAHS, H. 2016. Die U-Bahnstation Wittenau (Wilhelmsruher Damm). *bahnbilder.de*.
- LINDVED NORUP, M. 2021. Regeringen ser flere overvågningskameraer som vejen til mere tryghed for kvinder. *DR*.
- LOEWEN, L. J., STEEL, G. D. & SUEDFELD, P. 1993. Perceived safety from crime in the urban environment. *Journal of environmental psychology*, 13, 323-331.
- LOUKAITOU-SIDERIS, A. & FINK, C. 2009a. Addressing Women's Fear of Victimization in Transportation Settings: A Survey of U.S. Transit Agencies. *Urban affairs review (Thousand Oaks, Calif.)*, 44, 554-587.
- LOUKAITOU-SIDERIS, A. & FINK, C. 2009b. Addressing women's fear of victimization in transportation settings: A survey of US transit agencies. *Urban affairs review*, 44, 554-587.
- MERRIAM-WEBSTER 2021. safety. *Merriam-Webster*.

- NASAR, J. L. & JONES, K. M. 1997. Landscapes of fear and stress. *Environment and behavior*, 29, 291-323.
- OSTROM, V. 1975. *Defensible Space: Crime Prevention Through Urban Design*. By Oscar Newman. (New York: The Macmillan Company, 1972. Pp. 264. \$8.95.). *American Political Science Review*, 69, 279-280.
- OU, Q. 2017. A Brief Introduction to Perception. *CSCanada*, 15, No. 4, 2017, 18.
- OUALI, L. A. B., GRAHAM, D. J., BARRON, A. & TROMPET, M. 2020. Gender differences in the perception of safety in public transport. *Journal of the Royal Statistical Society. Series A, Statistics in society*, 183, 737-769.
- OXFORD LEARNER'S DICTIONARY. 2020. *Perception* [Online]. Available: <https://www.oxfordlearnersdictionaries.com/definition/english/perception> [Accessed].
- PLAN E.V. 2020. *Pressematerial Safe In The City*.
- POHLAN, J. E. A. 2019. *Monitoring Soziale Stadtentwicklung*. HafenCity Universität Hamburg.
- RUITER, R. A. C., ABRAHAM, C. & KOK, G. 2001. Scary warnings and rational precautions: A review of the psychology of fear appeals. *Psychology & Health*, 16, 613-630.
- RÖßNER, J. 2018. Das sind die gefährlichsten U-Bahnhöfe Berlins. *Welt*.
- S-BAHN BERLIN GMBH. 2016. *Hausordnung für Bahnhöfe* [Online]. Available: <https://sbahn.berlin/fahren/bahnhofsuebersicht/hausordnung/?acc=a7277-t1> [Accessed 17.06.21 2021].
- S-BAHN BERLIN GMBH. 2020. Available: <https://sbahn.berlin/en/about-us/> [Accessed 08.12.2020].
- SAFETY, H. 2020. *Difference between the safety and security* [Online]. Occupational Safety & Health (OSH). Available: <https://www.hseblog.com/difference-between-the-safety-and-security/> [Accessed 14.06.21 2021].
- SALEK DE BRAUN, S. H., PAULO 2018. A safe city for women and girls is a safe city for everyone.
- SENGES 2021. *Bezirksprofile 2019*. berlin.de.
- STANKO, E. A. 1995. Women, crime, and fear. *The Annals of the American Academy of Political and Social Science*, 539, 46-58.

- SVENSDOTTER, A. & GUARALDA, M. 2018. Dangerous Safety or Safely Dangerous. Perception of safety and self-awareness in public space. *The Journal of Public Space*, 3, 75-92.
- TAYLOR, R. B. & SHUMAKER, S. A. 1990. Local crime as a natural hazard: Implications for understanding the relationship between disorder and fear of crime. *American journal of community psychology*, 18, 619-641.
- UN. 2020. *Universal Declaration of Human Rights* [Online]. Available: [https://www.un.org/en/universal-declaration-human-rights/#:~:text=\(1\)%20Everyone%20has%20the%20right,to%20return%20to%20his%20country.](https://www.un.org/en/universal-declaration-human-rights/#:~:text=(1)%20Everyone%20has%20the%20right,to%20return%20to%20his%20country.) [Accessed 11.12. 2020].
- VERKEHRSBETRIEBE, B. 2018. Sicherheitsbericht der Berliner Verkehrsbetriebe 2018.
- VERKEHRSBETRIEBE, B. 2020. *BVG* [Online]. Available: bvg.de [Accessed 08.12. 2020].
- WEKERLE, G. 2000. From eyes on the street to safe cities (Jane Jacobs' book, The 'Death and Life of Great American Cities'). *Places (Cambridge, Mass.)*, 13, 44-49.
- YAVUZ, N. & WELCH, E. W. 2010. Addressing Fear of Crime in Public Space: Gender Differences in Reaction to Safety Measures in Train Transit. *Urban Studies*, 47, 2491-2515.

APPENDICES

A Survey questionnaire

The Perception of personal safety at underground train stations in Berlin

Hello and welcome to my survey!

Are you...

...female,

...between 18 and 50 yrs old,

...a user of the public transport system in Berlin?

Support my master's thesis and participate in this super short survey!

My name is Michaela Schmidt and I study Urban Ecological Planning at the Norwegian University of Science and Technology. My Master's thesis is about young females' perception of personal safety at underground train stations in Berlin.

The survey is anonymous and no personal information will be collected . For more information or questions, you can contact me via e-mail: michschm@stud.ntnu.no.

What train station is your home station?

The one closest to your home, that you use most frequently (over- or underground)

How safe do you feel at your home station after dark? (8pm - 6am)

Rate from **1 = very unsafe** (feelings of fear can arise, the station will be avoided if possible) to **5 = very safe** (no safety concerns)

Are there certain underground train stations in Berlin you try to avoid after dark? (8pm - 6am)

Are there certain underground train stations in Berlin you feel safe at after dark? (8pm - 6am)

To what extent do the following factors influence your feeling of safety when waiting at a public transport station at night?

one star = low impact (feeling safe), five stars = high impact (feelings of fear can arise)

Graffiti



Low cleanliness of station area



Vandalism (e.g. broken station furniture, damaged ticket machines or information displays)



Bad lightning



Individuals that seem unpredictable due to intoxication or other reasons



Groups that seem unpredictable due to intoxication or other reasons



Very empty stations with only few more passengers waiting



Very busy stations with a lot of other passengers waiting



Low familiarity and knowledge of the station layout



Survey created with
 LamaPoll

Low familiarity and knowledge of the area around the station



Bad image of the area around the station (e.g. high crime rates, low-income neighborhood etc.)



Other 1



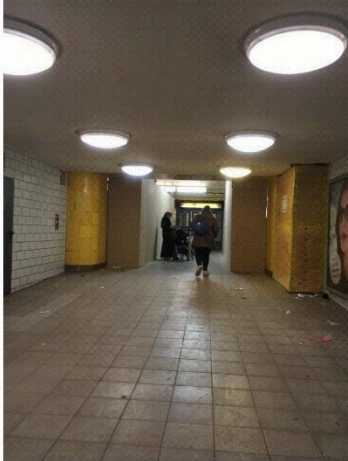
Other 2



Other 3



Rate the following images regarding to how safe you would feel in that space:



Space 1



Space 2



Space 3



Space 4

Rate from **1 = very unsafe** (feelings of fear can arise, the station will be avoided if possible) to **5 = very safe** (no safety concerns)

<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Thank you for your participation!

This survey participates in the Thesius Network lottery. Participants of this survey will receive a lottery ticket through the following link:

<https://www.thesius.de/umfrage/masterarbeit-thema-bqxnDNGa/vbmopkne>

I like to thank you for your time and interest to answer this survey.

Survey created with
 **LamaPoll**

B Interview Guide

Master Thesis project in Urban Ecological Planning

Interview Guide for Semi-structured interviews

Interviewer: Michaela Schmidt

Interviewee: _____

Date: _____

Introduction – Explanation of the project

I am a student in the international master's program 'Urban Ecological Planning' at the Norwegian University of Science and Technology. For my master's thesis I will investigate the female perception of personal safety on public transport. The aim is to understand if and to what extent a person's physical (build) and social (the people around us) environment influences how safe this person feels in a certain situation. The interview will not take longer than 30 minutes and all data gathered will be used solely for the purpose of this research. All data will be anonymized and stored safely.

Area of interest	Question	Probe
Icebreaker	How often do you use public transport in Berlin?	What is a typical journey you undertake by public transport? Can you describe the journey?
General relationship to public transport usage	Is public transport your preferred mode of transportation?	Would you rather use a car, bike, walk etc. if you could choose?
What environments trigger feelings of unsafety in general	Are there certain areas in Berlin that you prefer not to use public transport in?	Why?
	Does the time of the day have an influence on that?	Why?
	In which part of a public transport journey are you most likely to feel unsafe? (Walking from and to the station, waiting at the station or being on the public transport vehicle?)	Why?
Specific environment that caused a feeling of unsafety	Have there been situations where you felt unsafe while using public transportation?	Can you describe the situation and your surroundings?

C Information letter and consent form for interview participants

Are you interested in taking part in the research project "The female perception of personal safety at underground train stations in Berlin" ?

This is an inquiry about participation in a research project where the main purpose is to understand if and to what extent a person's physical (build) and social (the people around us) environment influences how safe this person feels in a certain situation. In this letter we will give you information about the purpose of the project and what your participation will involve.

Purpose of the project

The master's thesis on the topic of female perception of personal safety at underground train stations in Berlin is the final project to complete the two-years master's degree in Urban Ecological Planning. To plan and develop urban spaces that are inclusive and give the user a sense of safety, it is important to understand which factors contribute to a feeling of unsafety and might therefore exclude people from certain spaces. With regards to public transport it is desirable that all users feel safe and can thus take full advantage of the freedom in mobility a public transport system offers. Women perceive safety different to men and are more likely to feel unsafe in public spaces.

This research's objectives are to

- examine underground train stations in Berlin with regard to feelings of unsafety
- identify patterns of certain characteristics that contribute to the feeling of unsafety

Who is responsible for the research project?

The Norwegian University of Science and Technology (NTNU) is the institution responsible for the project.

Why are you being asked to participate?

The research investigates young female's perception of personal safety in particular. Participants should be between 18 and 50 years old and live, work or study in Berlin.

What does participation involve for you?

If you choose to participate in the project, an interview will be conducted which will take approximately 15 minutes. The interview includes questions about how you use public transport and whether you have experienced situations in which you felt unsafe while using public transport. The interview will be recorded.

Participation is voluntary

Participation in the project is voluntary. If you chose to participate, you can withdraw your consent at any time without giving a reason. All information about you will then be made anonymous. There will be no negative consequences for you if you chose not to participate or later decide to withdraw.

Your personal privacy – how we will store and use your personal data

We will only use your personal data for the purpose(s) specified in this information letter. We will process your personal data confidentially and in accordance with data protection legislation (the General Data Protection Regulation and Personal Data Act). Only the student, carrying out the research, will have access to the personal data. Names and contact details will be replaced with a code. The list of names, contact details and respective codes will be stored separately from the rest of the data.

What will happen to your personal data at the end of the research project?

The project is scheduled to end on the 10th of June 2021. Personal data will be stored after that until the project is graded and passed, and subsequently made anonymous and archived for follow-up studies.

Your rights

So long as you can be identified in the collected data, you have the right to:

- access the personal data that is being processed about you
- request that your personal data is deleted
- request that incorrect personal data about you is corrected/rectified
- receive a copy of your personal data (data portability), and
- send a complaint to the Data Protection Officer or The Norwegian Data Protection Authority regarding the processing of your personal data

What gives us the right to process your personal data?

We will process your personal data based on your consent.

Based on an agreement with NTNU, NSD – The Norwegian Centre for Research Data AS has assessed that the processing of personal data in this project is in accordance with data protection legislation.

Where can I find out more?

If you have questions about the project, or want to exercise your rights, contact:

NTNU via Helge Hillnhütter, by email: helge.hillnhutter@ntnu.no, or by telephone: +4773559479.

NSD – The Norwegian Centre for Research Data AS, by email: personverntjenester@nsd.no or by telephone: +47 55 58 21 17.

Yours sincerely,

Helge Hillnhütter
Project Leader
(supervisor)

Michaela Schmidt
Student

Consent form

I have received and understood information about the project “The female perception of personal safety at underground train stations in Berlin” and have been given the opportunity to ask questions. I give consent:

- to participate in an interview that will be recorded

I give consent for my personal data to be processed until the end date of the project, approx. 10. June 2021.

(Signed by participant, date)

Link to give consent digitally: <https://forms.gle/EdQDyGZKfcc7oErn8>

D Public transport network in Berlin

