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MOBILITY OF NON-BINARY AND GENDER NONCONFORMING PEOPLE IN TAMPERE REGION:
Issues around accessibility, harassment, and safety

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ABSTRACT

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The gendered nature of travel behaviours and experiences have long been recognised in research and policy making. However, research on non-binary people and their mobility is scarce, as is the acknowledgement of a spectrum nature of gender within the transportation discipline. The objectives of the thesis are two-fold. This thesis presents the first systematic literature review of the mobility and travel experiences of non-binary people. To corroborate the findings of the review, a survey was developed, and quantitative and qualitative analysis of the responses performed. The review identified that, to date, the main research domains for non-binary people's mobility considered issues of harassment and violence on public transit, fear, security measures, intersectionality, and strategies to deal with discrimination. The quantitative findings were scarce yet showed statistically significant higher odds of harassment on public transport by non-binary compared to men, yet lower than those of women. However, the qualitative analysis of the data showed very similar findings to those of the literature review, highlighting the importance of going beyond quantitative statistical analysis. The thesis highlights spatial and geographical constraints, such as immobility and accessibility, that non-binary people face when interacting with public transportation system. Strategies to improve mobility for the gender nonconforming community included upgrading public transport stations, increasing funding for public transportation, and providing gender diversity training for transit workers. The findings draw attention to the need for substantial further transportation research into the field. By including non-binary perspectives in transport research, a unique range of insights and experiences can be unlocked, while increasing inclusivity in transport research.

Keywords: Mobility, gender, non-binary, LGBTQ+, transgender, systematic review, survey

The originality of this thesis has been checked using the Turnitin OriginalityCheck service.

PREFACE

This thesis is based on the article “Mobility of Non-Binary and Gender Nonconforming Individuals: A Systematic Literature Review”, co-authored with Steve O’Hern and submitted to the Journal of Transport Geography.

I fear that if I tried to be sincere for over 100 words, my teeth would fall out. So I’ll try to make this quick.

This thesis was a long and uneasy adventure that I, at some point, thought would never end. Now, a year and a half later, I have a lot of thank-yous to say because none of this would’ve gotten done without the love and help of people that are still around me, and some that no longer are.

A very special thank you to Steve who, at times, believed in me more than I did. Without your never-ending support and the arrogance you instilled in me, I wouldn’t have gotten even half as far.

Thank you to Jon for getting this writing into a decent thesis shape and dealing with all my terrorising Teams messages at questionable times.

To my dear friends in and out of Urbanum, co-workers at Verne and family, thank you for bearing through my bad jokes and keeping me in good spirits.

To Aurora, who kept up with all of this and made me laugh when I needed it the most.

Finally, I want to pay homage to my grandmother, Valya, who gave me so much passion and strength to keep going but didn’t get to celebrate this day with me. Thank you for always seeing me for who I was and I will always remember you for who you were.

Torre Vieja, Spain, 25 May 2024

Oxana

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1. INTRODUCTION

An effective transition towards a sustainable transportation system requires addressing widespread barriers, such as immobility, harassment and fear of violence. To create an equitable and just transportation system it is necessary to understand and evaluate the complex gendered experiences of mobility and public transit. This aligns with the UN's 2030 sustainable development goals, specifically Goal 5 (Gender Equality) and Goal 11 (Sustainable Cities and Communities) (United Nations, 2015).

There is a greater threshold for overcoming transport poverty and immobility barriers for gender minorities due to marginalisation and discrimination (Gorman-Murray & Nash, 2016; Luibheid, 2008). Historically, socio-economic discrimination of vulnerable groups, including gender minorities, have resulted in vulnerable populations depending more on public transportation (He et al., 2022). Furthermore, it is important to acknowledge that justice in mobility stems not only from physical accessibility but also from eliminating social, cultural, and spatial constraints that burden individual mobility (Shakibaei & Vorobjovas-Pinta, 2022).

Gender is one of the major intersecting marginalised identities that creates unique barriers to accessibility for transit riders (Loukaitou-Sideris, 2016). There is a significant body of research on the travel experiences of women and men, how their travel behaviours differ, and what kind of mobility challenges they face (Law, 1999; Pollard & Wagnild, 2017). However, with the public space being constructed as heterosexual and gender-normative, all diversions from the gender structures often fall out of the scope of research and implemented policies in public transportation systems (Cresswell & Priya Uteng, 2008). Beyond this, Cresswell and Priya Uteng (2008, p. 7) argue that if a person's "gender is not male, they are mobility-poor", highlighting the significant gender bias that exists in the transportation system. Furthermore, those who do not fit into the traditional binary standards of gender, encounter even more barriers and challenges while using the public transportation system (see Lubitow et al., 2017; Shakibaei & Vorobjovas-Pinta, 2022).

Butler (1999, p.178) states that "gender is a performance with clearly punitive consequences", rather than a binary form. People whose gender identity corresponds with the sex they were assigned at birth are considered to be cisgender, otherwise

they are considered to be on the transgender spectrum (American Psychological Association, 2018). However, transgender people may not distinctively fall into one of the two gender categories instead they are “outside of or between” those categories (Monro, 2019, p. 1); the most common terms and self-identification labels for those people are non-binary, genderqueer, and gender nonconforming. There are different estimates of the proportion of the non-binary population within the transgender population; in the UK study, 52% of 14,320 transgender participants identified as non-binary (Government Equalities Office, 2018), while in Canada, 41% of 839 transgender youth were non-binary (Clark et al., 2018). An aggregate literature analysis estimated that approximately 20% of the general transgender population identifies as non-binary or gender nonconforming (Nieder et al., 2018). Irrespective of the exact proportion, non-binary persons represent a non-negligible proportion of the population, yet they are often overlooked in transport research.

The concept of queer mobilities covers a range of scholarship on how members of the LGBTQ+, (an umbrella term for marginalised sexualities and gender identities) community experience mobility; it includes questions of identity, visibility and harassment on public transport (Weintrob et al., 2021). However, a noted limitation of queer research to date is that most studies were conducted amongst samples of educated, gay, white, cisgender, males that were significantly less marginalised and more represented (Weston, 1995), when compared with people of colour, feminine-presenting, transgender and non-binary members of LGBTQ+ communities.

While queer mobility research mostly focuses on how sexual minorities interact with transportation, a newly emergent branch of scholarship on transmobilities covers mobility experiences of transgender and gender nonconforming individuals, including non-binary and genderqueer people (Lubitow et al., 2017). This term is more oriented towards the research goal of this study, as it explores the unique non-homogenous experiences, patterns and challenges of gender nonconforming transit riders who are often affected by “intersecting forms of oppression” (Lubitow et al., 2017, p. 2). Mobility is considered to be one of the “dimensions of LGBTQ discrimination” (Weintrob et al., 2021, p. 10), as it poses restraints of accessibility on queer people when using the transportation system, such as travel stress, fear of violence and hypervigilance of the surroundings.

The novelty of sustainable mobility paradigm lies in the idea of “strengthening the links between land use and transport” (Banister, 2008). Transportation constitutes one-fourth of all greenhouse gas emissions in Europe (European Environmental Agency, 2024); thus, to transition towards a sustainable way of living, carbon-neutral

accessible mobility must become a priority in policy making, land use and transportation planning. Moreover, a shift towards sustainable mobility does not only concern environmental aspects of transport, but also the economic and social components. To account for those aspects of sustainability, a mobility justice approach is implemented to analyse social and economic accessibility challenges of public transit. Mobility justice is a modern theorisation of a transition toward more just and equitable mobilities for all; it's a key to creating an environmentally and socially sustainable transportation system (Sheller, 2018). Intersecting identities of the transit riders inevitably influence their mobility, creating uneven access to the transportation system. Mobility justice helps to understand different political, cultural and ethical implications of varying accessibility levels related to uneven distribution of resources and opportunities (Shakibaei & Vorobjovas-Pinta, 2022). Another approach to dissecting the accessibility of public transport is through the lens of Walzer's "spheres of justice" (Martens, 2012; Shakibaei & Vorobjovas-Pinta, 2022, p. 4; Walzer, 1983). Applying Walzer's spheres of justice leads to the paradigm that access to public transportation should not be contingent on factors such as privilege, money and power. Despite an increasing amount of scholarship on mobility justice, it is yet to become a "mainstream concern in transport mobility research" (Ernste et al., 2012, p. 5). It can be argued that transit justice faces limitations in "theorization of mobility, space and justice"; as accounting for redistribution of resource is often not enough, with a shift in the way resources are created and valued being a crucial step to overcoming "geographies of domination" (Enright, 2019, p. 2). To a large extent, transit justice and right to the city are interconnected, as capacity to engage in travel, accounting for spatial and social mobility of the residents, is tied to their ability to access economic opportunities and resources of the city (Enright, 2019). To conclude, researching mobility justice in terms of intersecting identities is crucial in retheorising movement, motility and space.

Transport policies and mobility research need to account for marginalised riders, as they are more likely to be affected by the changes due to their transit dependency. Moreover, it is crucial to make public transit safe and welcoming, since upon overcoming socio-economic barriers and transit dependency, marginalised populations are more likely to increase their car dependency to avoid unpleasant experiences, which has a negative impact on the climate, environment and land use (García et al., 2022). The omission of non-binary individuals in transport research imminently leads to data violence, the negative effect of systematic exclusion of certain groups from

information and research field (Hoffmann, 2017). The negligence leads to an oversight in the implementation of policies, often due to a lack of language to address these groups (Elliott, McLeod, et al., 2022).

It is apparent that research on non-binary people and their mobility is scarce, as is the acknowledgement of a spectrum of gender within the transportation discipline. The nature of this thesis is two-fold, a combination of a systematic literature review with an empirical data collection and analysis through a survey. As such, the aim of the thesis is to study the existing literature on the mobility and travel experiences of non-binary people along with identifying research gaps. Another goal of the thesis is to provide best practice recommendations that can improve the inclusivity of the transportation system and to use survey results to corroborate the findings and apply them to the Tampere region. The objectives are to conduct a systematic literature review using PRISMA guidelines, and to collect and perform empirical data analysis using a survey to corroborate the findings of the literature review and apply them to the Tampere region.

2. METHODOLOGY

2.1 Literature review

A systematic literature review was carried out to identify research papers and articles on the mobility and travel experiences of non-binary individuals using the updated Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines (Page et al., 2021). The search was carried out in September of 2023 using two databases, the Transport Research Board and the Web of Science. Initially, the search also included terms related to sexualities to have a grasp on the existing queer mobilities literature, however those articles were considered to be out of scope for the research question and therefore, the search string was modified.

The search in the Transport Research Board aimed to capture an exhaustive list of articles mentioning gender nonconforming persons and their experiences with the transportation system. Therefore, the search was performed using the following search string: Non-binary OR Nonbinary OR Genderqueer OR Genderfluid OR Transgender OR Queer OR LGBT OR LGBT+ OR LGBTQ OR "Gender identity" OR Agender OR "Gender Nonconforming" OR "Gender Minority".

In the Web of Science, the aforementioned search terms were used along with the topic-specific category for "Transportation". Both searches were limited to peer-reviewed articles, papers and reports and the language to English. A snowballing technique, referred to as "pursuing references of references" (Greenhalgh & Peacock, 2005, p. 2), was implemented to identify missing literature and expand the pool of publications by reviewing reference lists of the selected articles.

2.1.1 Synthesis of the Selected Articles

The initial search identified 44 articles in the Transport Research Board and 79 articles in the Web of Science, resulting in a total of 123 articles, as shown in Figure 1. Three (3) articles were identified through the snowballing technique. Among the selected articles, 14 duplicate articles were removed. 71 articles were removed during screening due to irrelevant uses of search terms that were outside of the scope of the research, reducing the sample to 41 articles. The remaining 41 articles were assessed for eligibility, with 10 articles fitting the criteria to be evaluated in the literature review.

There were two main criteria to assess the eligibility of the articles: an explicit mention of non-binary or gender nonconforming people in the body of text and transportation or mobility- related topics included in the article. The articles were excluded for several reasons:

- the research focused on queer mobilities, but did not consider gender non-conforming people (n=10);
- the research was focused on gender identity and mobilities yet only considered binary genders (n=15);
- the research was not related to transportation or mobility (n = 6).

It is noted that some of the eliminated articles were used for the general theoretical background and discussion on queer mobilities, however they were not considered in the results and findings of the literature review as they did not specifically address the research question. Thus, the analysis was performed on the selected 10 full-text articles that mentioned non-binary or gender nonconforming people and are directly related to mobility.

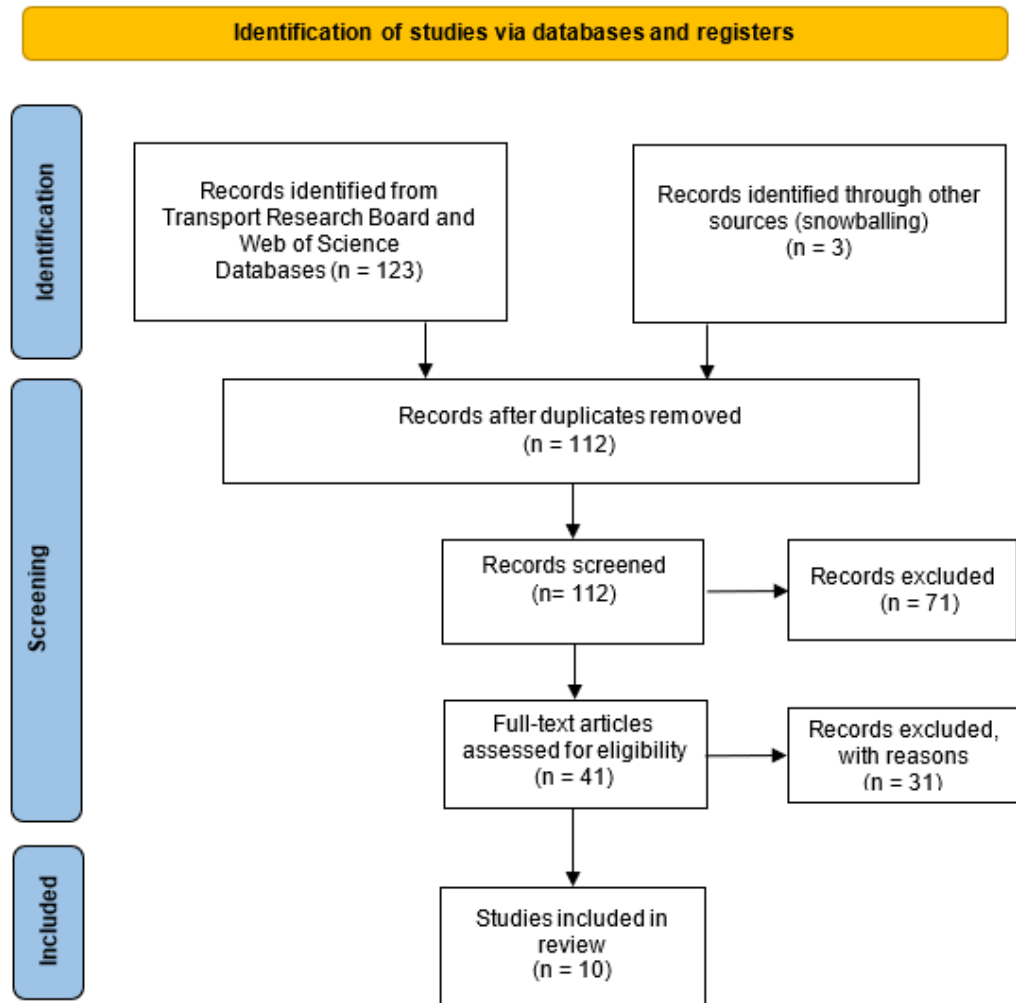


Figure 1. Flow diagram for systematic review of non-binary people in transport research

2.1.2 Analysis

Thematic analysis was performed on the selected articles, and they were classified according to the findings in relation to non-binary and gender nonconforming participants. Thematic analysis was chosen as the desired analysis method due to flexibility and accessibility of this “bottom-up” approach; it allows for systematic identification and organisation of mentioned patterns and themes (Braun & Clarke, 2012). An inductive approach is most appropriate for this research question, as it allows for the themes to be derived from the literature itself rather than the “top-down” deductive method that “brings to the data a series of concepts, ideas, or topic” for analysis and

interpretation of the said data (Braun & Clarke, 2012, p. 3). Each of the identified themes is discussed in section 3.2 with references to analysed papers. Based on the findings of the papers and additional literature, transport policy implications and best practice recommendations for inclusive mobility research are provided in the discussion.

2.2 Survey

2.2.1 Data collection

Data for this study was collected through online survey in two steps. The survey was developed based on the findings of the literature review. The aim of the survey was a) to collect data on the unique issues faced by nonbinary and gender nonconforming people and b) to collect data from a binary control group to compare the quantitative data on the harassment on public transport.

A survey (attached in the appendix) regarding travel experiences with a focus on gendered aspects was initially sent out in two Tampere-based LGBTQ+ organisations (Sekava and Seta). The survey (appendix 1) was first sent out in the queer organisations in order to oversample the desired target group (non-binary and gender nonconforming persons). Afterwards, the same survey was sent in the university internet website Intra. The survey was approved and did not collect any personal identifiable data. The survey itself included demographics and travel experience questions. Demographics questions asked about age, ethnicity, city of residence and gender identity in a written format. Travel experiences questions started with asking about whether one has experienced harassment on public transport in a Likert scale form, with 1 being never and 5 being always. In case respondent answered 1 on this question, they were prompted to finish the survey. In other cases, they proceeded with questions related to harassment on public transport, such as the type of harassment (verbal and/or physical), the perception of correlation between harassment and gender presentation (yes or no), influence of negative experiences on travel decisions (written response), possible coping strategies (multiple-choice answers) and an open-ended question asking for any other gendered mobility related information a participant is willing to share.

2.2.2 Quantitative analysis

Microsoft Excel, SPSS (Statistical Package for the Social Sciences) and R (programming language for statistical analysis) was used in the quantitative analysis of the survey responses. Excel was used to visualise the demographic (gender and ethnicity) proportions of responses concerning harassment on public transport. In order to evaluate a numerical correlation between the intersection of gender identity, ethnicity and level of harassment on public transport, ordinal and binary logistical regression was run in SPSS. Using R, an ordinal logistic regression was performed to estimate the odds of increasing levels of harassment based on person's gender identity, both with and without adjusting for ethnicity, and to produce a chart to visualise it.

2.2.3 Qualitative analysis

The qualitative analysis of data was conducted with the help of thematic analysis. Whereas in the literature review a bottom-up inductive approach was used in order to evaluate themes and patterns in the literature, during the qualitative analysis of the collected open-ended responses a deductive top-down approach was implemented as well (Braun & Clarke, 2012). The emerged topics and themes from the literature review are connected to the responses of the survey and are used to make sense of the patterns and common experiences with mobility of non-binary respondents.

3. RESULTS

3.1 Literature review

3.1.1 Summary of included studies

Table 1 provides a summary of the included studies, including: the authors and year of publication, study design and method (which refers to the methodological approach of the selected papers); the purpose of the study (which refers to the aim and the desired outcomes of the studies); the sample size of non-binary people; recognised gender identities beyond the binary (which refers to all the recognised and mentioned gender identities in the studies); the country of the conducted research; and the results of the study in relation to non-binary people, where the outcomes of the papers in the direct relation to non-binary or gender nonconforming individuals are presented.

The majority of the studies used qualitative (García et al., 2022; Lubitow et al., 2017, 2020; Shakibaei & Vorobjovas-Pinta, 2022; Weintrob et al., 2021) or mixed method (Abelson et al., 2023; Gandy et al., 2021) study approaches, with the exception of three studies that used quantitative methods (Cubells et al., 2023; Elliott, Peterson, et al., 2022; He et al., 2022). All the included studies were published between 2017 and 2023, despite no time restrictions being placed on the article searches.

Concerning the sample size and future analysis in the included articles, two articles did not have any non-binary participants in their sample data; non-binary people were either only mentioned in the theoretical section (García et al., 2022) or the study had a non-binary option in the gender question, yet none of the respondents chose it (Cubells et al., 2023). Four articles had limitations and did not find specific results during analysis due to the small sample size of non-binary participants; the paper by Elliott, Peterson, et al. (2022) excluded the non-binary participants (n=58) from secondary analysis, the paper by He et al. (2022) combined non-binary participants (n=16) with female participants in some of the statistical analysis, the paper by Abelson et al. (2023) did not find any specific outcomes for non-binary participants (n=2) and the paper by Gandy et al. (2021, p. 10) mentioned “limited generalizability” of findings due to a nonrepresentative sample (n=7). Two articles have mentioned a lack of analysis of gender minorities’ experiences in the limitations of the articles (Cubells

et al., 2023; Elliott, Peterson, et al., 2022). The remaining studies presented significant findings related to the mobility and transit of non-binary and/or gender nonconforming people.

Most of the articles were written in the US (7), while the remaining three originated in the UK and Israel (1), Spain (1), and Turkey (1). As the language of the articles was restricted to English, the scope of the research inevitably excluded research written not in English. Furthermore, some countries may have different terms for what is considered to be non-binary, and therefore, remain unaccounted for in this study. The majority of the selected research articles centre around the Global North, and therefore only address the people, challenges and issues therein. Notwithstanding the non-homogeneity of the non-binary population that was researched within the transportation field, there were some patterns that can be traced throughout different contexts, both cultural and geographical.

Authors, year	Study design and method	Purpose	Sample size of n-b people	Gender identities defined beyond binary	Country	Results in relation to n-b individuals
Abelson et al., 2023	Mixed method; Photovoice methodology and video-call interviews	Studying the experience of marginalised groups on the transit and their social exclusion.	N=2 (6% out of total 35)	Non-binary, genderqueer	USA	<ul style="list-style-type: none"> No specific findings related to the gender minorities. General policy recommendations for marginalised groups
Cubells et al., 2023	Quantitative analysis of GPS-tracked trips	Analysing travel behaviour of micromobility users by intersecting identities (including gender).	N=0 (0% out of 89)	Non-binary	Spain	<ul style="list-style-type: none"> No participants identified as non-binary despite being given a gender option
Elliott et al., 2022	Quantitative analysis; Exploratory cross-sectional study	Analysing active transportation behaviour through the effects of gender identity/sexual orientation.	N=58 (1.5% out of 3947)	Agender, androgyne, demi gender, genderqueer, gender fluid, queer, questioning/unsure, trans man, trans woman	USA	<ul style="list-style-type: none"> Significant intersection between gender identity and sexuality in terms of preference for the active transportation (specifically biking)
Gandy et al., 2021	Mixed-methods study; Quantitative and qualitative analysis	Investigating unique barriers of transgender and gender diverse individuals in rural settings.	N=7 (29.2% out of 24)	Gender diverse, non-binary, genderqueer, agender, demi-gender	USA	<ul style="list-style-type: none"> Travel burden is exceptionally high for transgender and gender diverse individuals in the rural areas. Lower accessibility to gender-affirming care due to geographical isolation and immobility
García et al., 2022	Qualitative interviews; Photovoice methodology	Demonstrating harassment faced by low-income women of colour on transit.	N=0 (0% out of 22)	Gender nonconforming individuals	USA	<ul style="list-style-type: none"> Acknowledgment of a greater harassment levels faced by non-binary people in compassion with gender conforming individuals
He et al., 2022	Quantitative analysis of a survey that includes demographic characteristics	Understanding the impacts of Covid-19 on the essential transit users.	N=16 (3% of total 495)	Non-binary genderqueer, or other gender identities	USA	<ul style="list-style-type: none"> Covid-19 exacerbated existing transport burdens for non-binary and other marginalised groups

Authors, year	Study design and method	Purpose	Sample size of n-b people	Gender identities defined beyond binary	Country	Results in relation to n-b individuals
Lubitow et al., 2017	Qualitative interviews analysis	Analysing experience of gender nonconforming individuals on public transit, drawing connection between gender and urban mobility.	N=12 (45% out of 25)	Genderqueer (6), non-binary (1), agender (3), genderfluid (1), male and female (1), demigirl (1), two spirit (1)	USA	<ul style="list-style-type: none"> • Unequal access to public transit, harassment, and lack of anti-discrimination policies. • Visibly gender nonconforming riders reported a higher incidence of violence and harassment overall. • Intersectionality of the issues faced by non-binary riders. • Lack of mobility access perpetuates gender inequality on a large scale
Lubitow et al., 2020	Qualitative interviews analysis	Demonstrating the challenges faced by gender minorities on public transit.	N=12 (48% out of 25)	Genderqueer (6), non-binary (1), agender (3), genderfluid (1), male and female (1), demigirl (1), two spirit (1)	USA	<ul style="list-style-type: none"> • Significantly higher levels of harassment and discrimination, along with travel stress and anxiety. <ul style="list-style-type: none"> • Higher transit dependency. • Policy recommendations for inclusion and accessibility of non-binary people on public transport.
Shakibaei & Vorobjovas-Pinta, 2022	Qualitative interviews; thematic analysis	Investigating the uneven access to mobility and urban leisure by marginalised groups.	N=49 (not specified between trans and gender diverse individuals)	Gender-diverse individuals	Turkey	<ul style="list-style-type: none"> • Interconnectedness between fear of violence (rather than violence itself) and immobility faced by non-binary individuals. • Intersectionality of discrimination and immobility. • Policy recommendations for inclusion and safety.
Weintrob et al., 2021	Qualitative analysis; Feminist epistemological and methodological analysis	Exploring "queer mobilities" and queer people's exclusion from heteronormative spaces.	N=2+2 (out of UK (210) + Israel (118) sample)	Gender-fluid, non-binary, other-questioning, genderqueer	UK and Israel	<ul style="list-style-type: none"> • Higher levels of gender-based fear and violence due to the diversion from social norm of gender presentation. <ul style="list-style-type: none"> • Higher dependency on transit. • Concealing one's identity for the sake of safety on transit.

Table 1. Full text literature retained.

3.1.2 Travel Experiences of Non-binary and Gender Nonconforming Individuals

Harassment and Violence

Transport research on non-binary individuals often explores the aspects of harassment and discrimination while interacting with the transportation system, with seven out of ten selected articles mentioning these phenomena in one way or another (Gandy et al., 2021; García et al., 2022; He et al., 2022; Lubitow et al., 2017, 2020; Shakibaei & Vorobjovas-Pinta, 2022; Weintrob et al., 2021). Non-binary and gender nonconforming people were more likely to have concerns about harassment using public transit than cisgender people (García et al., 2022; He et al., 2022). Everyday violence and discrimination on public transport were often associated by the participants with their visible appearance as non-binary (Shakibaei & Vorobjovas-Pinta, 2022; Weintrob et al., 2021). The “diversion” from the social norm of gender presentation led to higher levels of perceived harassment (Lubitow et al., 2017; Weintrob et al., 2021). The majority of gender-based violence occurred in three different scenarios while using public transit: at bus and train stops from passersby when waiting, while riding public transport from other passengers due to a lack of conductors and security officers, and on rare occasions, participants experienced verbal harassment or misgendering by transit employees (Shakibaei & Vorobjovas-Pinta, 2022). Ultimately, experiences of harassment and violence on public transit influence gender nonconforming people’s perception of safety and comfort in public spaces, along with contributing to greater levels of travel anxiety and stress.

Fear

A commonly mentioned theme was the feeling of discomfort and fear due to the possibility of harassment; fear is a substantial barrier for queer and trans mobilities (Weintrob et al., 2021). Multiple articles focused on how fear shapes the experience of public transport and affects the travel patterns of marginalised populations (Lubitow et al., 2017, 2020; Shakibaei & Vorobjovas-Pinta, 2022; Weintrob et al., 2021). However, the perception of fear does not necessarily correlate with the actual level of reported crimes. Perceived safety and reported violence often differ quite dramatically due to not all violent attacks being reported and accounted for in the statistics (Mason, 2001; Weintrob et al., 2021). Studies have found that female and non-binary individuals have higher levels of fear about potential crime, yet male riders are more likely

to experience violent attacks themselves (Lubitow et al., 2020; Shakibaei & Vorobjovas-Pinta, 2022). In contrast, Weintrob et al. (2021) found that women experience more violent incidents than non-binary persons and men, while non-binary persons experience more violence than men.

Queer women and non-binary participants brought up a key idea of “double victimisation” as a basis for increased harassment due to their feminine presentation (Weintrob et al., 2021, p. 8). Higher levels of travel stress may also be reflected in the transport mode choices of marginalised groups, such as choosing private transportation over micromobility (for example, e-scooters) and active transportation (Elliott, Peterson, et al., 2022) or avoiding public transit at night (Shakibaei & Vorobjovas-Pinta, 2022). Due to persistent fear of negative experiences on public transport, gender non-conforming participants often regarded the ideal experience on transit as “neutral and forgettable”, one that did not cause any confrontations (Lubitow et al., 2017, p. 7). This finding has potential impacts on the transition towards sustainable transportation, as the feelings of discomfort and fear may encourage people to use safer but less environmentally friendly modes of transportation (García et al., 2022).

Security measures

The attitudes concerning the police and surveillance on public transit were heterogeneous depending on the context. Some studies found a positive correlation between the feeling of safety and various types of law enforcement, such as security guards, police and random patrols, and additional security measures, including CCTV and alarm buttons (Shakibaei & Vorobjovas-Pinta, 2022; Weintrob et al., 2021). In Istanbul, participants indicated that they feel safer in “the visible presence of transport officers” (Shakibaei & Vorobjovas-Pinta, 2022, p. 15), and in the UK, participants also mentioned the significance of security measures and the visibility of transport staff for the feeling of safety (Weintrob et al., 2021). In contrast, other studies found that police presence intensifies feelings of fear and persecution (García et al., 2022; Lubitow et al., 2017, 2020). The fear of police involvement may be attributed to the cultural perception of police in the geographical location of the studies. The studies that showed a negative impact on the feeling of safety were conducted in the US, which has documented instances of police brutality (Lyle & Esmail, 2016). Moreover, this phenomenon is attributed to the intersectionality of mobility, as participants often referred to their other marginalised identities (e.g. race, ethnicity, and class), as the reason for unfair treatment by the police (García et al., 2022; Lubitow et al., 2017). Additionally,

during the COVID-19 pandemic, transit-dependent marginalised individuals had greater concerns about police interactions due to reduced ridership of transit non-dependent people explained by the “feelings of isolation and vulnerability” (He et al., 2022, p. 9). Therefore, there is no consensus on whether law enforcement improves the experiences of gender nonconforming people on public transport as it varies drastically in different socio-cultural and geographical contexts.

Accessibility and Transit Dependency

Non-binary and gender nonconforming individuals generally have a lower level of accessibility to transit and mobility due to historical marginalisation and systematic oppression they face (He et al., 2022). Rural gender nonconforming individuals face unique barriers related to geographical isolation and high travel burden affiliated with low accessibility of gender-related care services (Gandy et al., 2021). In their study, Gandy et al. (2021) identified that 70% of the participants had to travel out of state with an average of an hour and a half of travel time to access gender-affirming care and most (83.3%) relied on private transportation. Non-binary riders were also more likely to have greater difficulty accessing essential services (grocery, pharmacy, healthcare, child care) compared to male riders (He et al., 2022). Due to their transit dependency, non-binary and gender nonconforming participants have reported greater difficulties during the reduction of transit services throughout the COVID-19 pandemic (He et al., 2022). The difficulty with accessing and safely using public transportation attributes to the general “immobility” of LGBTQ+ persons and can be considered one of the aspects of discrimination (Lubitow et al., 2017; Weintrob et al., 2021, p. 11). To conclude, the nature of immobility in rural areas stems predominantly from the geographic isolation and physical inaccessibility, whereas in urban areas they are mostly related to socially constrained mobility barriers.

Intersectionality

Intersectionality is a theoretical framework that accounts for multifaceted systems of oppression faced by marginalised group, it investigates the discrimination and privilege through the lens of intersection of social positions, such as race, class, gender and sexuality (Bauer et al., 2021). A large part of problematic experiences on public transportation system stem from the intersecting identities of oppression held by non-binary and gender nonconforming individuals. (García et al., 2022; He et al., 2022; Lubitow et al., 2017, 2020; Shakibaei & Vorobjovas-Pinta, 2022). Mobility justice

scholarship argues that persons with intersecting marginalised identities (low-income, racial, ethnic and gender minorities, etc.) while having lower accessibility to public transit, are more likely to depend on it (Abelson et al., 2023; Lubitow et al., 2020). In the study by Lubitow et al. (2017), the overwhelming majority of participants were transit-dependent, which is related to the broader economic disadvantage of marginalised groups. The socio-economic status of transit riders was often detrimental to their use of public transport even while not feeling safe (Lubitow et al., 2017). Participants' other marginalised identities (often race or ethnicity) made them feel targeted by the police and lessened their feeling of safety; their identities made them subjected to "overlapping systems of oppression" (García et al., 2022; Lubitow et al., 2017, p. 16). In the (2017) study by Lubitow et al., the only participants who did not report any violent experiences on public transport were white people. This finding shows how certain privileges, such as race, can help gender nonconforming people bypass harassment in public spaces. Being a part of the lower socio-economic class exacerbated mobility barriers during Covid-19 for gender nonconforming participants, as they were more likely to be transit-dependent (He et al., 2022). Participants also identified public transport in lower socio-economic and more conservative areas as bearing higher risk of harassment and potential violence (Shakibaei & Vorobjovas-Pinta, 2022). Disability was mentioned as one of the identities that contributed to the immobility and other challenges gender minorities face on public transportation (Lubitow et al., 2017). The lack of intersectional analysis makes it difficult to differentiate between what forms of privilege help mitigate harassment and violence on public transit (Lubitow et al., 2017).

Strategies to Deal with Harassment

To deal with harassment and discrimination based on visual gender nonconformity, non-binary participants indicated that they often had to conceal their gender expression for the sake of preventing potentially violent outcomes on public transit (Lubitow et al., 2017; Shakibaei & Vorobjovas-Pinta, 2022; Weintrob et al., 2021). Moreover, the ability to "pass", altering one's gender expression to fit into binary normative gender boundaries, resulted in participants gaining mobility and avoiding discrimination on public transport (Shakibaei & Vorobjovas-Pinta, 2022; Weintrob et al., 2021). Constant awareness and hypervigilance of the surroundings to prevent acts of violence were mentioned as a way of protecting oneself; however, continuous stress from these routines causes negative health outcomes for gender minorities (Lubitow et al.,

2017; Scandurra et al., 2019; Weintrob et al., 2021). Ignoring harassment was a commonly used strategy to deal with unpleasant experiences (Lubitow et al., 2017; Weintrob et al., 2021). Non-binary and gender-diverse persons often changed their commuting schedule or altered their trips according to the times or routes they found safer and less problematic (Abelson et al., 2023; Lubitow et al., 2017; Weintrob et al., 2021). Conversely, despite the possibility of violence and harassment, LGBTQ+ participants often “refused to be excluded” from public transit spaces (Weintrob et al., 2021, p. 9) and rather adapted to the situation with various coping strategies.

3.1.3 Policy Implications

Transport Stations

A proposed way to reduce harassment at bus stations was ensuring “the visibility of the security officers, reliability of schedules and shorter waiting time” (Shakibaei & Vorobjovas-Pinta, 2022, p. 10); those are the attributes that usually made participants feel safer at train stations. However, as mentioned before, in the American context, participants refused to believe that additional surveillance and transit police presence would increase their feeling of safety due to the possibility of racial profiling and police brutality (García et al., 2022; Lubitow et al., 2017, 2020); therefore, geographically and culturally appropriate policies must be implemented accordingly. The use of diverse and proactive advertisements and messaging that includes gender minorities was mentioned as a way to enhance the feelings of safety of gender-diverse riders (Lubitow et al., 2017; Shakibaei & Vorobjovas-Pinta, 2022). Another suggested solution to improve the inclusivity of public transit is to encourage transit operators to collect data about anti-LGBTQ+ violence within their sphere of operation and to implement appropriate policies to reduce the acts of violence (Weintrob et al., 2021). MaaS (mobility as a service) can prove to be helpful in the future for improving the feeling of safety for the gender-diverse public, in particular mobile phone applications were pinpointed as a tool to help safely navigate public transport (Shakibaei & Vorobjovas-Pinta, 2022).

Educating Transit Workers

One of the commonly mentioned recommendations in the articles on marginalised mobilities is the education of transit workers on gender diversity issues (Abelson et al., 2023; Lubitow et al., 2017; Shakibaei & Vorobjovas-Pinta, 2022). By providing

appropriate education to the transit workforce, they should be able to “de-escalate problematic situations” and ensure the safety of the journeys (Shakibaei & Vorobjovas-Pinta, 2022, p. 14). Hiring a diverse transit workforce that comes from different underprivileged backgrounds can facilitate the creation of a “welcoming environment (...) and compassionate policy” that encourages safe and comfortable use of public transport for vulnerable riders (Abelson et al., 2023, p. 25). The use of gender-neutral terms was noted as important in the situation of interacting with transit employees (Lubitow et al., 2017; Shakibaei & Vorobjovas-Pinta, 2022), as misgendering was attributed to the aspects that made non-binary participants anxious and uncomfortable in public transport spaces.

Funding

Due to higher dependency on public transportation, cuts in the transit budget disproportionately affect non-binary and gender nonconforming people, as well as other marginalised groups. Therefore, “short-term funding injections” are not enough to compensate for the long-term underfunding of bus lines and alternative transit models that are mostly used by vulnerable transit-dependent riders (He et al., 2022, p. 12). Potential measures to make public transportation accessible for LGBTQ+ travellers include fare reductions and subsidies for underprivileged riders and improving bus services to important LGBTQ+ events and venues (He et al., 2022; Weintrob et al., 2021). There is an evident lack of verbiage and explicit language to address marginalised populations in transport policy (Elliott, McLeod, et al., 2022). It is especially problematic, as it negatively affects the possibility to acquire targeted funding and resources that would benefit non-binary and gender nonconforming riders.

3.2 Survey results

The results of the data analysis were divided into two parts: the quantitative and qualitative analysis. In total there were 107 valid responses from the city of Tampere; 32 identified as men, 58 identified as women, and 17 as non-binary or some other type of gender nonconforming identity. Only 8 out of respondents reported their ethnicity as anything other than Finnish or any other European ethnicity. Due to low sample sizes, ethnicities were categorised as white and non-white. All of the people that were part of perceived ethnic minorities had binary gender identities; therefore, explaining adjustment for ethnicity resulted in inconclusive outcomes. The average age

was 28. The descriptive statistics of the survey respondents' demographic details is presented in **Figure 2**.

Gender identity	Women	58
	Men	32
	Non-binary and Gender Nonconforming	17
Ethnicity	White ("Finnish", "Slavic", "French")	99
	Non-white ("Mixed", "Asian", "Latina", "Indian", etc.)	8
Average Age	28.44	

Figure 2. Descriptive statistics of the survey demographic.

Figure 3 presents significant findings concerning the gendered nature of harassment on public transport. It shows, though, women are more likely to experience higher extremities (3 or 4 out of 5) on the harassment spectrum, non-binary respondents are more likely to experience harassment in general (>1 out of 5). Only 52.3% of non-binary and gender nonconforming people never experienced any harassment on public transport, compared to 61.4% of females and 65.6% of males. **Figure 4** shows higher levels of harassment among "white" group of respondents, yet it is not conclusive due to only 8 people being part of the ethnic minorities.

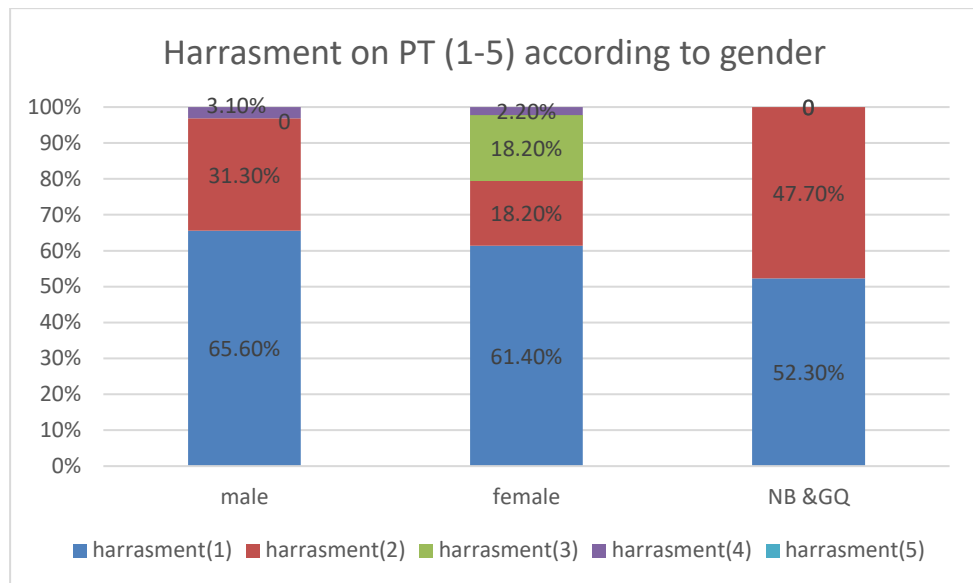


Figure 3. Percentage components of harassment levels according to gender.

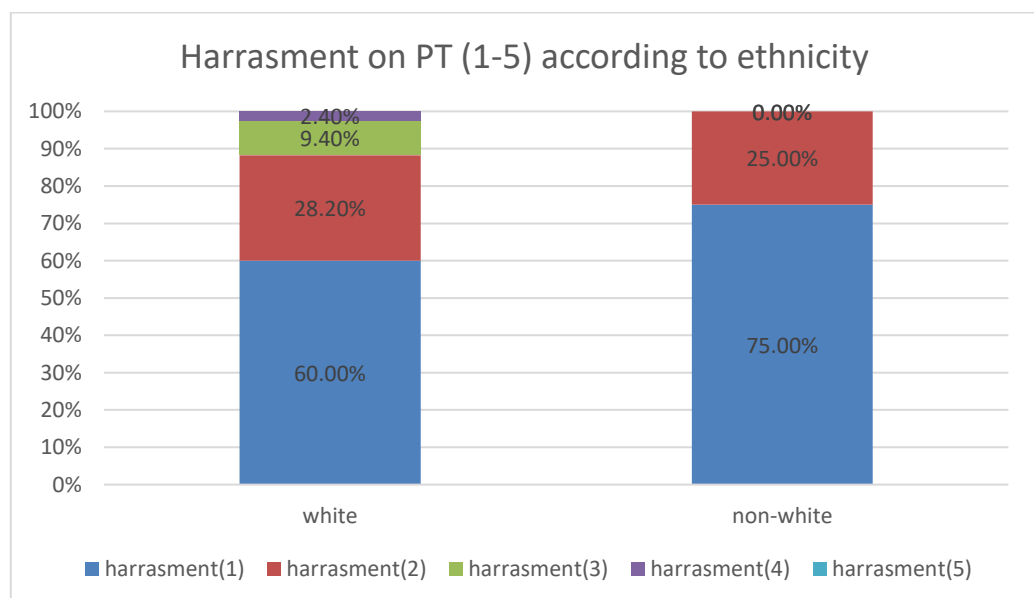


Figure 4. Percentage components of harassment levels according to ethnicity.

3.2.1 Quantitative results

The quantitative analysis was performed exclusively on the respondents that identified their city of residence in Tampere city region (city of Tampere, Kangasala, Nokia, Orivesi, Ylöjärvi and the municipalities of Lempäälä, Pirkkala and Vesilahti) (Tampereen Kaupunkiseutu, 2024)

Ordinal logistical regression

The ordinal logistical regression was run with gender as a covariate. It did not lead to any conclusive outcomes as all the results were statistically insignificant (**Table 2**).

Parameter Estimates								
		Estimate	Std. Error	Wald	df	Sig.	95% Confidence Interval	
							Lower Bound	Upper Bound
Threshold	[harassment = 1]	.266	.479	.309	1	.578	-.673	1.206
	[harassment = 2]	2.467	.558	19.551	1	<.001	1.373	3.560
	[harassment = 3]	4.175	.846	24.380	1	<.001	2.518	5.832
Location	[men]	-.409	.604	.458	1	.499	-1.593	.775
	[women]	.484	.540	.803	1	.370	-.575	1.542
	[non-binary and gender nonconforming]	0a	.	.	0	.	.	.
Link function: Logit.								
a. This parameter is set to zero because it is redundant.								

Table 2. Ordinal logistical regression with no significant differences

Binary logistical regression

The binary logistical regression was run afterwards to look for patterns with a more distinct differentiation between 1 (never harassed) and 2 to 5 (had experiences of harassment), as there were gendered differences in the summary of the responses (**Figure 3**). Yet, the binary logistical regression also did not indicate significant differences (**Table 3**).

Parameter Estimates							
Parameter	B	Std. Error	95% Wald Confidence Interval		Hypothesis Test		
			Lower	Upper	Wald Chi-Square	df	Sig.
(Intercept)	1.411	1.1560	-.854	3.677	1.491	1	.222
[white]	-.961	.8597	-2.646	.724	1.251	1	.263
[non-white]	0a	.	.	.	.	.	.
[men]	.493	.6306	-.743	1.729	.612	1	.434
[women]	-.270	.5637	-1.374	.835	.229	1	.632
[non-binary and gender nonconforming]	0a	.	.	.	.	.	.
Age:	-.013	.0240	-.060	.034	.307	1	.580
(Scale)	1 ^b						

Table 3. Binary logistical regression with no significant differences

Odds ratios

The odds ratio plot (**Figure 5**) for the ordinal harassment level score showed minor but significant results concerning the impact of gender and ethnicity on the level of harassment in public transport. The amount responses of people whose ethnicity could not be considered white was so low, that the odds ratio plot did not show any significant results concerning their harassment experiences. The plot showed an approximately 2.5 times higher chance of getting harassed on public transport if one identifies as woman than a man. Non-binary people had lower likelihood of being harassed than women, yet still higher than men, although it was not significant. The odds

ratios for the ordinal logistical regression (no harassment experience (1) vs some harassment (>1)) showed very similar results, with women experiencing 2.2 higher odds of harassment and non-binary people 1.7, compared to men (**Table 5**).

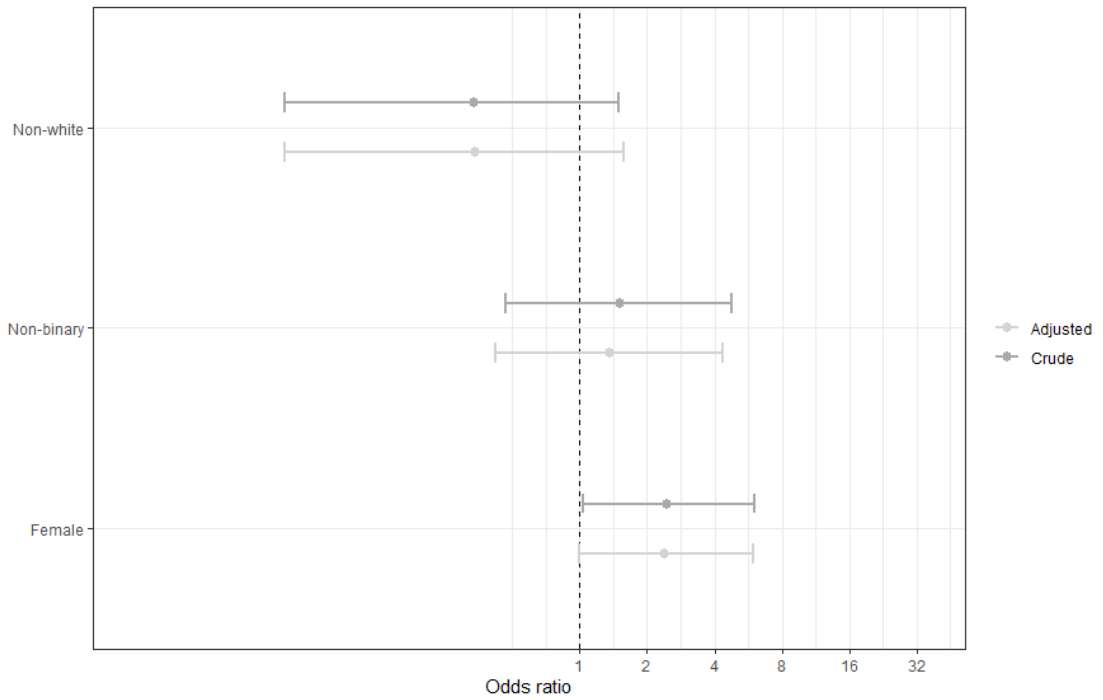


Figure 5. Odds ratio of likelihood of getting harassed against the base line (white male).

Variable	Coef (B)	Odds Ratio (Exp (B))	95% C.I. Lower	95% C.I. Upper	P-Value
Gender (male)					0,227
Gender (female)	0,785	2,192	0, 897	5,356	0,085
Gender (NB & GQ)	0,529	1,697	0, 511	5, 632	0,388

Table 5. Odds ratio of influence of harassment (>1) on travel choices (binary logistical regression).

When the ordinal logistical regression for the question about the negative experiences influencing travel choices was run against the same variables, very similar odds

ratios were found (**Figure 6**) with a higher risk for women (2.2 times) and non-binary (1.5 times) compared to men, yet nothing significant.

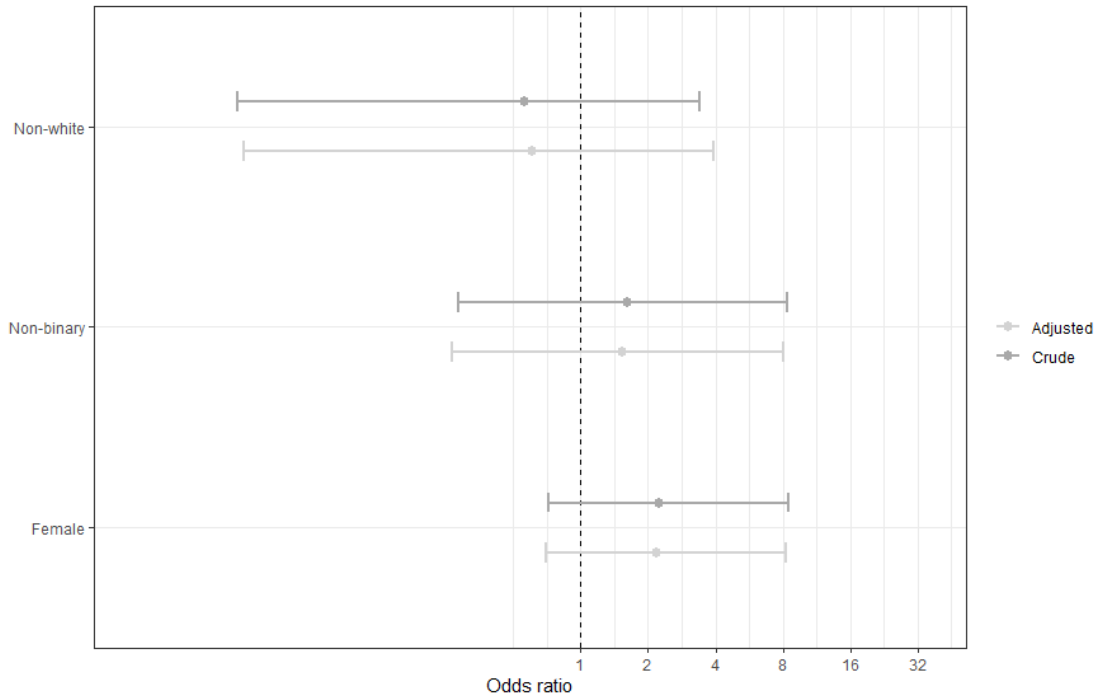


Figure 6. Odds ratio of influence of negative experiences on travel choices against the base line (white male).

Variable	Coef (B)	Odds Ratio (Exp (B))	95% C.I. Lower	95% C.I. Upper	P-Value
Gender (male)					0,441
Gender (female)	0,778	2,178	0, 648	7,316	0,208
Gender (NB & GQ)	0,427	1,532	0,295	7,956	0,611

Table 5. Odds ratio of influence of negative experiences on travel choices (binary logistical regression).

3.2.2. Qualitative results

Qualitative analysis highlighted issues around safety, discrimination and travel choices of non-binary and gender nonconforming people. 27 responses from non-binary and gender nonconforming people were analysed. No restriction to the geographical location of the respondents was posed; therefore, more survey responses were analysed than in the quantitative analysis of the survey.

Gender identities of survey respondents:

There were 18 people that identified as some type of non-binary (“non-binary femme”, “non-binary trans” or just nonbinary), 4 as agender, 1 as genderfluid, 1 as a “butch-twink”, 2 as a “trans man” and 1 as “trans female”.

Type of harassment experienced on public transport:

When asked about the types of harassment encountered, 13 people reported verbal harassment, with instances such as:

“Talking shit about me, shouting at me”

“Whispered conversations about my gender presentation and people refusing to sit near me”

As part of the reported verbal harassment, four people reported uncomfortable staring and side-glances from strangers:

“Intense and disturbing staring”

Five people reported physical harassment, with one of them being on the extremities of it:

“Threats of physical violence, including death threats, due to being visibly transgender”

Three people mentioned sexually harassment, such as groping and inappropriate touching:

“Sexually charged harassment typically directed at women”

Influence of negative experiences on travel choices:

When asked about whether negative experiences on public transit influence their travel choices, despite an overwhelming numbers of harassment cases faced by non-binary and gender nonconforming, most of the respondents answered “no”. One respondent referred to negative experience by stating that they *“refused to let them influence my choices of transport or travel”*, which encapsulates the general attitudes towards the harassment on public transport by non-binary people well. Only one respondent mentioned that their gender presentation influences their travel choices. Noteworthy, it was mentioned in the context of travelling, rather than commuting and due to the unsafety posed to queer people in general:

“But in countries where homosexuality is illegal, I wouldn’t dare go looking like this.”

One person mentioned their preference for personal transportation modes (walking/biking/driving) due to anxiety which has implications for sustainable mobility paradigm (García et al., 2022).

Relation of harassment to gender presentation:

The question about respondent’s opinion on whether the negative experiences on public transport were related to their gender presentation had a lot of intersectionality implications. Six people responded that their gender presentation was the root cause

of the harassment. However, five people responded that it was not due the gender nonconforming presentation but rather being perceived as female:

“My relatively androgynous but still female appearance can make me an “easy target” because I don’t look like someone who’d fight back.”

Multiple people mentioned that presenting non-binary prevents them from typical harassment that women experience:

“I don’t dress in femme style and I think because I look masculine it protects me a bit with harassment because I’m not the most normal femme looking person. But sometimes all it takes is that u have boobs which I can’t hide.”

Two people mentioned that negative experiences might’ve been related to their assumed (queer) sexuality:

“To the extent that non-conforming gender expression and assumptions of sexuality go hand in hand. I’ve been read as a lesbian and gotten verbally harassed as such, and people have started to talk about how wrong being gay is when I’ve entered the tram with my partner, who also is often read as a gnc [gender nonconforming] woman.”

Moreover, complex dynamic problems that come from intersecting identities of respondents show how gender, sexuality and privilege interact with one another in public spaces:

“I quite honestly think that as a nonbinary woman, I feel much more safe in public transport when expressing myself in my normal, masculine/neutral manner. Conforming to gender norms and dressing up for occasions leaves me much more vulnerable to everyday sexism and sexual harassment, because that’s when men like that pay more attention to me and maybe assume they “have a chance” or whatever, compared to when they assume I’m most likely a dyke.”

The respondents also recognised their (racial) privilege that made them less discriminated, despite existing problematic experiences related to gender:

“Mostly I worry about things women need to worry about in general when traveling and just out and about: sexual harassment due to perceived gender and misogyny (..)I've seen bus drivers ignore immigrants on bus stops in Finland, and I've never experienced anything as blatantly bigoted as that.”

Another issue that was brought up in context of intersecting identities was identified as being neurodivergent:

“Might be due to gender presentation but might also be due to my neurodivergence or most probably the combination of these two”

Only one person explicitly said they don't believe that their harassment was due to their gender presentation.

Coping strategies:

When asked about coping strategies to deal with negative experiences on public transport, 11 people reported that they usually ignore the situation, 9 people reported that they are expressing constant awareness and hypervigilance of surrounding and 2 people contacted conductor/driver in cases of harassment. Often, when reporting ignoring the situation as a coping strategy, they coupled it with hypervigilance of the surrounding:

“Outwardly ignoring the situation but being very aware of everything around me”

“I do notice people harassing me at times, but I try to just ignore and act as if I don't notice anything”

Other mentioned coping strategies included staying away from intoxicated people, changing seats and not travelling at night.

Multiple people asked other passengers for help when getting harassed:

“Nonverbally asking for support from fellow passengers”

Only one of the respondents said that they confronted their harasser at the spot:

“If I’m feeling arrogant enough I just might confront the harasser directly “

Even when not acting on the situation at the moment, people bring awareness to these cases afterward:

“But I talk about it later, tell people so they know and are maybe better equipped to step in if they later encounter someone being harassed.”

Problems

When given chance to elaborate on their negative experience, certain patterns were traced through the survey responses as to what made respondents feel unsafe on public transport.

Three people mentioned that traveling at night and alone made them feel uncomfortable because of the lack of other passengers that could prevent harassment from happening:

“During the day I’m less worried as I feel that members of the public would step in if I were to get assaulted, but for the sake of my safety I travel late at night and in remote areas only when necessary.”

Two people mentioned problems with legal travel documents due to being trans and due to fear of prejudice from transit workers:

“I haven't corrected my legal sex from f to m, partly because I fear that it would draw suspicions from drivers or inspectors and make traveling more stressful.”

“I prefer to use the public transports where the drivers or conductors only seldom ask me to prove my identity (for example to show my student card).”

Two people reported frustration with the inaction of other passengers when the harassment cases happened and wished bystanders would take a more active role in helping their fellow travellers.

4. DISCUSSION

The aim of this study was to systematically review existing literature related to the mobility of non-binary people and to survey the target group in Tampere region to corroborate the findings of the review. A total of 10 studies were identified that fit the eligibility criteria and were subsequently included in this systematic literature review. a total of 107 respondents were analysed, with 27 of them being on the non-binary and gender nonconforming spectrum. The thesis mostly focused on the travel experiences of non-binary individuals and the negative encounters they had on public transport.

The main domains of research that were identified in the literature review were harassment and discrimination on public transport, fear of violence, attitudes towards law enforcement, intersectionality, accessibility and strategies to cope with harassment. The vast majority of studies were conducted in the US, with the exception of three studies that were conducted in Spain, the UK and Israel, and Turkey. All studies were published recently (from 2017 to 2023), with a growing trajectory of research identified. This is a positive finding that highlights transmobilities becoming a growing area of scholarship with recognition amongst researchers of the need to investigate the spectrum nature of gender when considering the transportation system. Similarly, there is evidence of a growing number of non-binary and gender nonconforming persons among the youth population (Cameron & Stinson, 2019; Clark et al., 2018; Monro, 2019), implying that the current challenges with addressing this group will only become more prevalent in the near future.

A perspective that most of the articles delved into is the accessibility of transport for all, in relation to the mobility justice paradigm; it states that mobility research should account not only for the physical accessibility of transport but also for the socio-economic barriers, such as minority stress, that vulnerable riders face. A substantial difference in levels of accessibility of urban and rural non-binary populations is related to the social constraints to the mobility of the first and physical immobility due to geographical isolation of the second. Public policies related to public transportation often “overlook the feelings and vulnerabilities of LGBTQ people” (Weintrob et al., 2021, p. 6); thus, in order to create an equitable and just transportation system, interests and needs of the marginalised populations must be accounted for in research, planning and implementation of policies. Moreover, the exclusion from public spaces attributes

to the geographic and spatial injustice that constitute the discrimination LGBTQ+ people face.

The results of the quantitative analysis were inconclusive. Despite oversampling the target group (non-binary and gender nonconforming people), the quantitative results of an ordinal and binary logistical regression did not find statistically significant difference between levels of harassment on public transport and gender. Moreover, a limitation of the ordinal logistical regression is the proportional odds assumption, which could be dealt with by using Brant test. The slight significant difference was found in the odds of being harassed; non-binary people were more likely to be harassed than men, yet women were harassed the most.

However, the lack of quantitative findings only highlights the nuanced nature of the topic and the need go beyond statistical analysis. The qualitative analysis bears an even higher value, not only reiterating the points that were brought up in the literature review but showing a bigger picture scale as well. The fact that women are more harassed compared to non-binary and gender nonconforming people correlates very well with the findings of qualitative analysis. A notable proportion of non-binary respondents mentioned that the harassment happened not because of gender nonconforming presentation, but rather them being perceived as female. Therefore, in a way, presenting non-binary helps mitigate the misogyny and sexual harassment that female presenting people face. The intersectional implications of the study are clear yet complex; the intersection of identities creates a unique interlacement of privilege and discrimination. By accounting for the complexities of human lives and identities in the planning and research process, the transportation field with strive to be more inclusive and accessible for all.

Though the qualitative responses of binary population were not analysed systematically, the implications and safety concerns mentioned by women were very similar to those of non-binary and gender nonconforming. The similar concerns were expressed about travelling at night or alone, along with the experiences of harassment and hopes of fellow passengers' help in problematic situations. Safety measures showed that by planning for one marginalised group, the quality of service will improve for most.

While this study sought to identify literature using a systematic process, a potential limitation of this research comes from restricting the language of search to English, limiting the paper to a Western perspective. An example of a non-Western and non-English speaking perspective that could have contributed greatly to the discussion on

non-binary individuals and their experiences would be research from Thailand. In addition to the binary categories of male and female, Thailand legally recognise multiple non-binary gender categories, with 18 genders as a part of the common language (Coome et al., 2020). Gender diversity is much more visible and accepted in Thai society, providing crucial insight into the lived experiences of non-binary individuals along with policy implications and research practices, which could bring a new perspective into the Western research field (Skorska et al., 2021). Moreover, the narrow geographical scope of where the survey was conducted is a considerable limitation of this thesis. As Finland is generally a very safe country with very advanced public transport network (OECD, 2024), the findings are not applicable to a large extent in other countries.

The generalisability of the findings from this study is quite low due to the small sample of non-binary persons in the survey and the limited amount of the reviewed literature. As most of the non-binary participants were recruited through local LGBTQ+ networks, the findings of the review are based on the people involved within the community, who can differ from those who do not affiliate with it; thus, affecting generalisability of the findings to non-binary population (Scandurra et al., 2019). The same problem occurred with the distribution of this thesis's survey, as the easiest way to reach gender nonconforming people was through local LGBTQ+ organisations, yet it is not necessarily representative of the wider population. Furthermore, the qualitative methodologies used by most studies highlight limitations regarding transferability, as the research is highly dependent on the circumstances of the study, such as socio-economic, cultural and geographical context. While many issues were common amongst the reviewed articles, a notable geographic issue was the differences in attitudes towards law enforcement on public transit. In the American studies, transit police were regarded as threatening and anxiety-inducing (García et al., 2022; Lubitow et al., 2017, 2020), in contrast, most European studies identified police presence as a way to enhance the feeling of safety (Shakibaei & Vorobjovas-Pinta, 2022; Weintrob et al., 2021). The complex intersectional relationship between gender minorities, privilege and power is understudied and has broader societal dynamics and implications; it needs to be researched in the context of their influence on the mobility of gender nonconforming persons (Lubitow et al., 2020).

The current "hyper-mobile society" creates discussion on the meaning of transport and mobility in a societal context (Shakibaei & Vorobjovas-Pinta, 2022, p. 4). Not having equal access to mobility can significantly undermine the socioeconomic opportunities of vulnerable groups; mobility justice seeks to alleviate societal constraints that

burden individual mobility. “Differential mobility can weaken the leverage of the already weak” (Massey, 2008, p. 3); thus, attributing to the unequal and harmful power dynamics. The shortcoming of traditional planning stems from the focus on land use and transportation planning over catering the system to the unique needs and lived experiences of people (He et al., 2022).

Widespread urban planning policies, such as car-oriented planning and suburban zoning are perpetuating “structures of heterosexual domination” (Frisch, 2002, p. 3). To free the public spaces, substantial conscious efforts in undoing rigid heterosexist and gender-normative policies have to be undertaken. More importantly, understanding justice as an “ongoing spatial process”, rather than a “static end” (Enright, 2019, p.4-5) emphasises the meaning of transport in construction and restriction of space; highlighting the inadequate impact of redistribution transit policies on the embedded spatial injustices. To transition effectively to a sustainable mobility paradigm, it is necessary to account for the fact that harassment and discrimination on public transport work as a factor that can influence modal shift. As an example, there is a pattern of women dealing with harassment on public transit by switching to private transportation modes and “increasing car dependency”, which has adverse environmental impacts on the climate crisis (García et al., 2022, p. 2). Similar findings were highlighted in the survey, as one of the respondents mentioned their preference for private transportation because of the fear of harassment and prejudice on public transport. Being anxious and stressed about using public transport pushed people towards private modes of transport, biking and walking (in the best-case scenario) and driving (in the worst). By denying the minorities at risk access to safe and inclusive public transport network, a shift towards sustainable mobility paradigm is impossible. Thus, ideas of spatial justice and “right to the city” can be helpful in undermining the existing planning practices and moving towards a more equitable and just urban planning and human geography that accounts for accessible and just transportation for all.

Data violence is a phenomenon that captures harm that is caused by the continuous omission and exclusion of trans, non-binary and gender nonconforming people from information and government-run systems due to a lack of data collection (Hoffmann, 2017). Being invisible in research is often intertwined with “becoming invisible in culture more broadly” (Jaroszewski et al., 2018, p. 2); to understand the world with non-binary people in it, research must refrain from using gender binary methods. Exclusion from research surveys contributes to the exclusion in a broader context; as an example, the lack of acknowledgement of non-binary individuals in the health sphere and its research directly affects the quality of gender-related healthcare and attributes

to the perception of non-binary people “as an anomaly to health systems” (Jaroszewski et al., 2018, p. 2). It is particularly evident when looking at the research domains that transmobilities cover, while being an emergent field of research, it mostly covers the barriers that non-binary people face, however there are more mobility-affiliated domains that are characterised by gendered behaviours. For example, the gendered differences in travel behaviours, such as trip chaining (McGuckin & Murakami, 1999), transport poverty (Iqbal et al., 2020), automated (and e-) vehicle use (Hohenberger et al., 2016) and sustainability attitudes (Hanson, 2010) could differ drastically for those that do not fall into gender-normative categories, yet little is known about those differences. Moreover, with the constantly emerging new technologies in the transportation field, for example MaaS, it is possible to facilitate new practices and policies that would help alleviate the issues non-binary people experience on the transit. The advantages that MaaS can bring non-binary and gender nonconforming travellers are similar to those of women, as they experience similar negative experiences on public transport (McIlroy, 2023). Enhanced safety can be achieved through up-to-date information about security, services and stations that is based on users’ perception of safety or through safest route suggestions by the MaaS (McIlroy, 2023). Therefore, to accommodate and design for people of different backgrounds, their experiences must be taken into consideration without generalising the complexities of non-binary and gender nonconforming people’s their lives. Designing for the needs of the most vulnerable and overlooked groups could raise the overall experience for everyone. Moreover, without researching the needs of people from marginalised groups, it is impossible to account for the possible unique challenges they might face. Qualitative analysis of lived experiences of the target underrepresented groups can be helpful in bringing in the overlooked perspective.

In order to create inclusive research practices in the transportation field, best practice recommendations can be adopted from other fields of research that have established practices concerning inclusive gender data collection: for example, HCI (human-computer interaction) and psychology (Cameron & Stinson, 2019; Jaroszewski et al., 2018). It can be argued that despite common perception of the objectivity of research demographics data collection, gender questions are often “anything but inconsequential”, as they communicate researchers’ current understanding of gender diversity and ethics involved (Cameron & Stinson, 2019, p. 2). Data collection and analysis is not neutral but rather expressive of the political stances of the researchers that construct data collection design and categorise the data itself (Jaroszewski et al., 2018). A common practice across different fields is “othering” non-binary participants,

putting them in the same “other” gender box; yet, not only it assumes the similarity in behaviours of a diverse community, but it also separates them from the general demographic (Cameron & Stinson, 2019; Jaroszewski et al., 2018). Cameron & Stinson (2019, p. 6) argue that giving “other” as an only option outside of male/female dichotomy in research surveys implies that “genders beyond the binary are abnormal”. Therefore, researchers must consider how the differences in gendered travel behaviours can be acknowledged without becoming a dividing and alienating factor.

By focusing on addressing gender variation, rather than “dismissing it as noise” (Jaroszewski et al., 2018, p. 1), researchers can capture gender demographics better and account for the gendered differences. Some of the proposed methods for inclusive survey design are offering gender options beyond male/female dichotomy or allowing the choice of multiple genders rather than just one (Jaroszewski et al., 2018). Cameron & Stinson (2019) argue that the most inclusive way to collect gender data is by asking open-ended questions, and then if necessary, coding into categorical data for further statistical analysis within existing guidelines. Additionally, a crucial step for creating reproducible research and fostering inclusive research practices is reporting in detail the way demographics data is collected and measured (Cameron & Stinson, 2019). Finally, the use of explicit yet neutral verbiage in research and policies is necessary for addressing the accessibility disparities within the mobility of gender nonconforming demographic, as it helps to represent and target already disadvantaged communities (Elliott, McLeod, et al., 2022).

Multiple articles from the review mentioned the importance of the methodology and building rapport between researchers and participants (Lubitow et al., 2017, 2020; Shakibaei & Vorobjovas-Pinta, 2022; Weintrob et al., 2021). One of the commonly proposed methods of collecting demographic details was asking participants to talk freely about their gender and not impose gender categories on them (Lubitow et al., 2017; Shakibaei & Vorobjovas-Pinta, 2022; Weintrob et al., 2021). Asking respondents to describe their gender identity in their own terms resulted in a much more diverse and fluid gender presentation of identity (Lubitow et al., 2017). Another proposal to building rapport included not having a rigid structure to the interview so that respondents feel more comfortable with the interviewer (Lubitow et al., 2020; Shakibaei & Vorobjovas-Pinta, 2022). Queer and feminist methodological approaches were also deemed to be appropriate and helpful; disclosing personal information about researchers themselves being part of the LGBTQ+ community was seen as beneficial for building rapport (Weintrob et al., 2021).

5. CONCLUSIONS

This study presents the first systematic literature review, along with a data collection and analysis, on the mobility of non-binary and gender nonconforming people, providing insight into the gendered travel behaviours that extend beyond binary gender norms. Despite significant limitations, there are tangible findings on the mobility of non-binary people, that call for demographic-specific transport policies and research that directly addresses the gender-diverse public. The quantitative analysis showed higher odds of harassment on public transport for non-binary people and qualitative analysis corroborated the issues that were brought up in the literature review. The growing number of people who identify as non-binary or gender nonconforming and their interactions with different public spaces shows the need for established methodological practices to address and analyse the specific barriers these people face. Using inclusive language in data collection and research, implementing targeted traffic safety policies and designing transit stations in a safer and more accessible way are the first steps towards a more inclusive and sustainable mobility paradigm. This thesis not only outlines the existing research on gender nonconforming people within the transportation field and pinpoints the research gaps but will also hopefully serve as call for more inclusive research practices in the field and implementation of policies.

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APPENDIX A: SURVEY

Survey on travel experiences, with focus on non-binary and gender nonconforming people

Hi!

This survey is part of a Bachelor's thesis work on gendered mobility and public transport experiences with a particular interest in experiences of non-binary and gender nonconforming people. The survey will take around 5 minutes to complete and will contribute to the body of work on unique travel barriers and gendered mobility behaviours in Finland. Creating an equitable and just transportation system cannot be accomplished without contribution of all user groups, and this survey aims to include non-binary and gender nonconforming people's experiences with the public transportation system and inform policies seeking to reduce negative transit experience.

You are welcome to answer this survey even if you do not identify as non-binary or gender nonconforming person, as we need to collect data for the comparison groups as well.

You have to be at least 18 years old to answer this survey. No personal identifiable information will be collected through this survey. You can answer long questions in Finnish if it suits you better!

If you would like to further reach out concerning the survey or the thesis, my email is oxana.ivanova@tuni.fi; alternatively, you can contact my thesis supervisor, Jonathon Taylor, at jonathon.taylor@tuni.fi

Thank you for your time!

* Required

Demographics

1. Age: *

Please enter a number greater than 17

2. What is your ethnicity? *

3. Which city do you live in? *

Tampere

Other

4. Which gender identity do you most identify with? *

5. Have you experienced harassment on public transport? If so, how often?
(1-never, 5- always) *

1	2	3	4	5
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Experiences on public transport:

If you answered 1 ("I have never experienced harassment on public transport") on the previous question, you can submit the survey now. If you answered 2-5 on the previous question, please continue the survey.

6. What kind of harassment have you experienced on public transport? You can elaborate under the "other" box.

- Physical harassment
- Verbal harassment
- Other

7. Do you believe that negative experiences on public transport were related to your gender presentation?

- Yes
- No
- Other

8. Do negative public transport experiences influence your travel decisions? If yes, how?

9. Do you have coping strategies to deal with harassment on public transport? If yes, what are they?

- No
- Yes, contacting conductor/driver
- Yes, ignoring the situation
- Yes, concealing your gender identity
- Yes, constant awareness and hypervigilance of surroundings
- Other

10. Is there anything else you would like to mention that relates to your mobility from a gendered perspective? Any previous experiences, recommendations or wishes that you want to share about public transportation system?