

How Safe is the Delhi Metro? Insights from a Survey

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Abstract

Feelings of insecurity and lack of personal safety in public modes of transport have significant economic and human capital costs. This is more pronounced in developing countries where there is a greater dependence on such modes. South Asia is home to a vast majority of people who use public transport on a regular basis. This paper analyses the perception of safety amongst women and gender minority users of the Delhi Metro. My analysis finds that (i) an individual's comfort with strangers has a sensitive relationship with how safe they feel in the metro and (ii) individuals who consider the route from their place of residence to the nearest metro to be safe are more likely to feel safe. Based on such results, policy recommendations are offered to make the metro service in the city more gender-friendly and inclusive.

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1 Introduction

The use of public transport by ordinary people is a common sight in South Asia. Within public transport, an area that is increasingly being acknowledged is a distinct lack of personal safety. There is widespread academic and policy literature that acknowledges the pervasiveness of fear regarding the lack of personal security in public transportation systems around the world (see Mahmoud and Currie 2010, Gardner 2017, Heather Allen et al. 2018). This fear exists since individuals share their personal space in public which increases their chances of being victimised and harassed. This has dire consequences for the physical mobility of individuals, especially those who belong to marginalised and under-represented groups. For example, unsafe public transport in urban areas can inhibit people's ability to take advantage of the educational and employment opportunities that cities have to offer. Previous research (Mohan 2018, Asian Development Bank 2013) finds that fear of harassment in public transport may compel women to take up poorly-paid, menial jobs which are near their place of residence instead of jobs that may be far but for which they are better suited and qualified. Borker (2020) finds that such risk has repercussions on women's human capital formation via college choice. Finally, from a Capabilities Approach to Human Development, Nussbaum (2005) argues that fear has a negative impact on people's capabilities. Most public transport systems are gender-blind and do not take into account the diverse needs and requirements of women and gender minority (WGM) users. Personal safety is one such aspect that commands more attention. According to a study, developing countries, such as those in Latin America, have some of the most unsafe public transport systems for women in the world (Lockhart 2016).

This study focuses on the perception of safety amongst WGM users of the Delhi metro. Various surveys and reports have labelled Delhi to be highly unsafe for them due to the widespread prevalence of gender-based crimes. As per National Crime Records Bureau, Delhi has one of the highest crime rates against women in the country. This has ramifications on the type of transport they use, i.e., between private and public modes (Goswami and Pillai 2016). It was one of the 11 cities to be included in a study that revealed that 91% of urban women in India find public transport to be unsafe (Shah and Raman 2019).¹ Although some studies focus on Delhi's public transport system as a whole, the metro deserves separate attention. It is justified on the following grounds. First, the metro has a system of gender-based reservation that is unprecedented in public transport. The first coach of the metro is reserved for ladies. Furthermore, throughout the metro, certain seats are reserved exclusively for women. Secondly, with a combined daily ridership of nearly four million people, it is one of the most popular modes of transport in Delhi. It is favoured over other modes due to its connectivity throughout the city, affordability and convenience. Presently, there is an ongoing policy deliberation about making Delhi's public transport system more safe and more inclusive. There are several schemes initiated in this regard. A study of the present kind will help in understanding which aspects of the metro need to be improved upon.

¹Furthermore, the Lockhart (2016) study mentioned above found Delhi to have the 4th most dangerous public transportation system for women amongst the 15 largest capital cities across the globe.

To study the prevalence of safety concerns, a survey was deployed. This paper discusses the survey results and analyses the factors that influence the perception of safety amongst respondents. The rest of the paper is structured as follows: Section two discusses the literature. Section three describes the methodology. Following that, survey results are analysed in Section four. Section five brings out some policy recommendations following which I conclude the study.

2 Literature Review

2.1 Gender and Public Transport

Gender is one of the least understood sociodemographic variables in transport policy research (Asian Development Bank 2013). However, it is a key aspect that needs to be accounted for. The need to study gender in transportation stems from the understanding that men and women have different travel patterns and behaviours. There are significant differences in terms of transport mode, duration of travel, distance etc. (Ng and Acker 2018) In particular, it is important to note that women in urban areas engage in trip chaining, i.e., combining multiple, short destinations in one trip due to the gendered division of work where women have to take multiple trips to fulfil domestic and caretaking obligations (Peters 2013). Since they have to go to various places in just one trip, they might also have to incur higher costs for transportation. To avoid paying exorbitant fares, women prefer using cheaper modes of transport. It is therefore no wonder that women tend to use public transport significantly more times when compared to men (Duchene 2011, Rukmini 2018). In spite of this, transport policy, in general, tends to be largely ignorant towards the needs of women. These needs include, among others, aspects like affordability, comfort and a sense of personal safety (to be discussed next). Physical mobility is a hugely gendered phenomenon with men being at the centre of it. Although scholars have started acknowledging this gap, they largely confine their discussion to differences between women and men. This binary focus on men and women, thereby, often ignores other genders. While there are some studies that go beyond binary gender identities in public transport (Lubitow 2020), a significant number of them are based in Western countries. The present study lays its focus on women and other gender minorities using public transport in a developing country context.

2.2 Women, Safety and Public Transport

Threats to one's personal safety, both actual and perceived, act as a major hindrance in using public transport. Previous research (Ouali et al 2020) reveals that there is a statistically significant gender difference in how safe an individual perceives public transport to be. It is found that women are more fearful and feel more unsafe than men while using public transport. There are various reasons behind this difference. Women's fear regarding the lack of personal safety may stem due to limited surveillance, enclosed spaces with limited exits, dark and deserted spaces or previous incidents of sexual or verbal harassment (see Chowdhury et al 2020, Vanier et al 2017, Condon et al 2007). Surveys from around the world reveal the extent to which the issue of women's sexual harassment is pervasive. The issue is more serious in the developing world. For example, Kash (2019) finds that 37% of female users of public

transport in Colombia and Bolivia reported ever being harassed while commuting. There are various sociodemographic and psychological factors that influence the perception of safety amongst women in the use of public transport. This includes age, ethnicity, education, relative comfort with strangers (Condon et al 2007; Currie and Mahmoud 2013), among others.

Given the prevalence of such incidents on a routine basis, women develop ‘avoidance behaviours’ to feel safer (Vanier 2017; Gardner 2017). These behavioural adjustments include actions such as avoiding the use of public transport at night, carefully choosing the route and time of travel, and keeping others frequently informed of their location among many others. They may also limit their use of public transport or give it up altogether. While using public transport, women may prefer to travel with a companion, stay closer to other women or stand next to “safe people” (Kash 2019, Chowdhury 2020). This highlights the fact that women, in general, have to go out of their way to feel secure in public transport.

2.3 The Case of India and Delhi

Due to rapid urbanisation and the resulting need for sustainable transport, various modes of public transportation are increasingly becoming common in Indian cities. The most popular form of public transport across cities is hailed to be buses. As per the 72nd Round of the National Sample Survey Office, nearly 62% of households in urban India reported using buses. Many cities have developed Bus Rapid Transit Systems (BRTS) in order to fill the huge demand for bus services. Some cities (such as Delhi, Bangalore etc.), in addition to the BRTS, also have a comprehensive metro rail system that commuters can use.

Previous research on safety in Indian public transport reveals the prevalence of fear regarding lack of personal safety amongst women (Verma 2019, Shah and Raman 2019, Viswanath et al., 2015). A major reason behind this fear is the incidence of sexual harassment. Depending on which survey data one looks at, the rates of such incidents can vary across states and cities. For instance, in the Verma (2019) study which was conducted in Ahmedabad and Bangalore, about 10% and 38% of the respondents in the respective cities felt unsafe while using public transport due to such instances. Similar figures can be found for Mumbai, Kochi and other major cities. In order to ameliorate these fears, there have been various steps to ensure women’s safety. These include women-only buses, reservations in the metro, unified systems at state and national levels for GPS tracking via emergency buttons and video recording in buses and many others. However, they have not yielded desirable results (Shah et al. 2017).

This study is unique on two fronts. Firstly, gender minority individuals are rarely taken into account in discussions related to transport policy. Most studies on safety in public transport in India consider women only. This paper focuses on WGM users since it will help us in forming policy suggestions that will make the metro service inclusive in the right sense of the term. Secondly, focusing on the unique features of the metro will help us in understanding if any mode-specific characteristics influence safety perception.

3 Methodology

Given the discussion in the previous sections, this paper aims to study the perception of safety amongst WGMs in the Delhi metro. For that, a primary survey was conducted. It was targeted toward individuals who identify themselves either as a ‘Woman’ or as a gender minority. It was designed keeping in mind past studies that have focused on this issue. Additionally, discussions were also held with users to understand the nuances of their metro travel habits. There were four sections in the survey. The first one dealt with the respondents’ socio-economic background. Next, there was a section that captured patterns in their metro usage in terms of frequency, purpose etc. Following that, the third section dealt with their perception of safety in the metro in a variety of contexts. The last section contained views on some proposed policy measures to enhance women’s security. The following section brings out the survey results. I first present descriptive statistics about the respondents and their safety perceptions. Following that, I use ordinal logistic regression to understand the factors associated with the perception of safety in the Delhi metro.

4 Survey Results

4.1 Descriptive Analysis

There were 177 respondents to the survey. After accounting for all missing values, 171 eligible respondents were considered for the analysis undertaken here.² Table 1 gives a summary of the socioeconomic background of the respondents. The median age of the sample is 20 years. Most of the participants (around 70 per cent) are students who are currently pursuing an undergraduate course. Nearly a quarter of them have an annual family income of more than INR 20 lakhs. At least 36 per cent of them have access to a car to meet their regular transport needs. About 65 per cent of them live less than 10 minutes away from their nearest metro station.

Around 65 per cent of respondents stated that they preferred the women’s coach over other coaches. This is the first indication of the prevalence of women’s fear in the metro since they are “relatively” safer in the reserved compartment as opposed to the non-reserved ones. 63.2 per cent of them said that they used the reserved coach more frequently than the unreserved ones. 13 per cent of the respondents travelled daily in the metro while nearly 38 per cent travelled multiple times in a week. The most frequent use of the metro was for attending college/university (73 per cent of the time). This should not be a surprise given that most of the respondents were students. The most commonly used metro routes were the Yellow and Blue Lines with 71 per cent and 55 per cent of the respondents choosing these respective lines for their regular metro commute. This can be attributed to the fact that these lines have multiple exchange points which allow users to travel to far off places in the city. 65 per cent of the respondents selected two or more routes.

²Survey data can be made available upon reasonable request.

Table 1: Respondent Background

Characteristic	Groups	Percentage of Respondents
Annual Family Income	Less than 5 LPA	11.69
	Between 5-10 LPA	24
	Between 10-15 LPA	21.63
	Between 15-20 LPA	17.54
	More than 20 LPA	25.14
Private owned Transport	None	25.73
	Yes, a 2-wheeler	11.11
	Yes, a 4 wheeler	35.67
	Both 2 and 4 wheelers	27.49
Occupation	Student	82.45
	Others	1.18
	Employed	16.37
Education	School	2.93
	Undergraduate	73.1
	Postgraduate (Masters and Higher)	23.97
Religion	Hinduism	75.43
	Others	24.57
Time required to travel from home to the nearest metro station	Less than 5 minutes	25.14
	Less than 10 minutes	40.35
	Less than 20 minutes	23.98
	More than 20 minutes	10.53

Source: Survey responses.

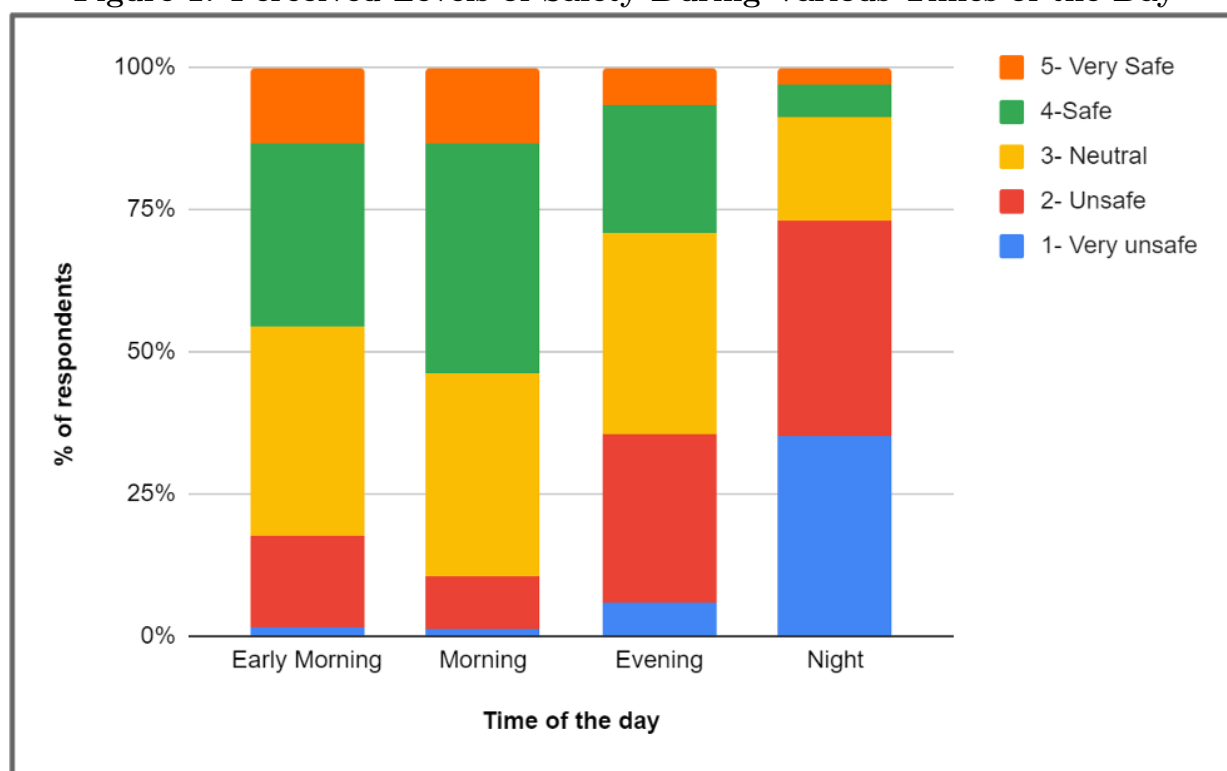
4.2 The Perception of Safety

Respondents were asked to rate how safe they feel in the non-reserved or general compartments of the metro. There were 5 levels of ratings: “Very Unsafe”, “Unsafe”, “Neutral”, “Safe” and “Very Safe”. This was done to remove the biases (feelings of more safety) due to the use of the reserved coach that could arise. Following Currie and Mahmoud (2013), safety ratings were marked on a scale of 1 to 5 with the former indicating “very unsafe” and the latter indicating “very safe”. They were asked to rate their perceived level of safety in various scenarios of the day. Figure 1 describes their responses. ‘Early Morning’ is defined as the time before 8 AM and ‘Night’ has been defined as the time after 8 PM for the study.

Data shows that 47 per cent of users feel either safe or very safe while using the non-reserved compartment of the metro during the “early morning” period. The morning period sees a continuation in the feeling of safety with 54 per cent of the respondents stating the same. Only 18 per cent and 11 per cent of people felt either unsafe or very unsafe in these respective periods. However, as evening and night time approaches, the change in the perception of safety is starkly evident. During the evening, 36 per cent of those surveyed stated they felt either unsafe or very unsafe. This figure shoots up to 73 per cent after 8 PM. This is in line with previous studies that show WGM users feel more unsafe during the night as compared

to daytime while using public transport.

Figure 1: Perceived Levels of Safety During Various Times of the Day



Source: Author’s Visualisation from survey responses.

About 72 per cent of people stated that they had a fear of being stared/ogled at. This was followed by the fear of being physically harassed (61 per cent). Table 2 shows the results of the experiences faced by the respondents. It also includes information on whether they have come across other people who have experienced safety issues in the metro. While most of the respondents did not face any direct attack, nearly a third of them faced threats. Furthermore, a majority of them had heard or seen others face threats/attacks in the metro. This is an important fact to understand since the experience of other individuals can influence the safety perceiving calculus of an individual in a negative sense.

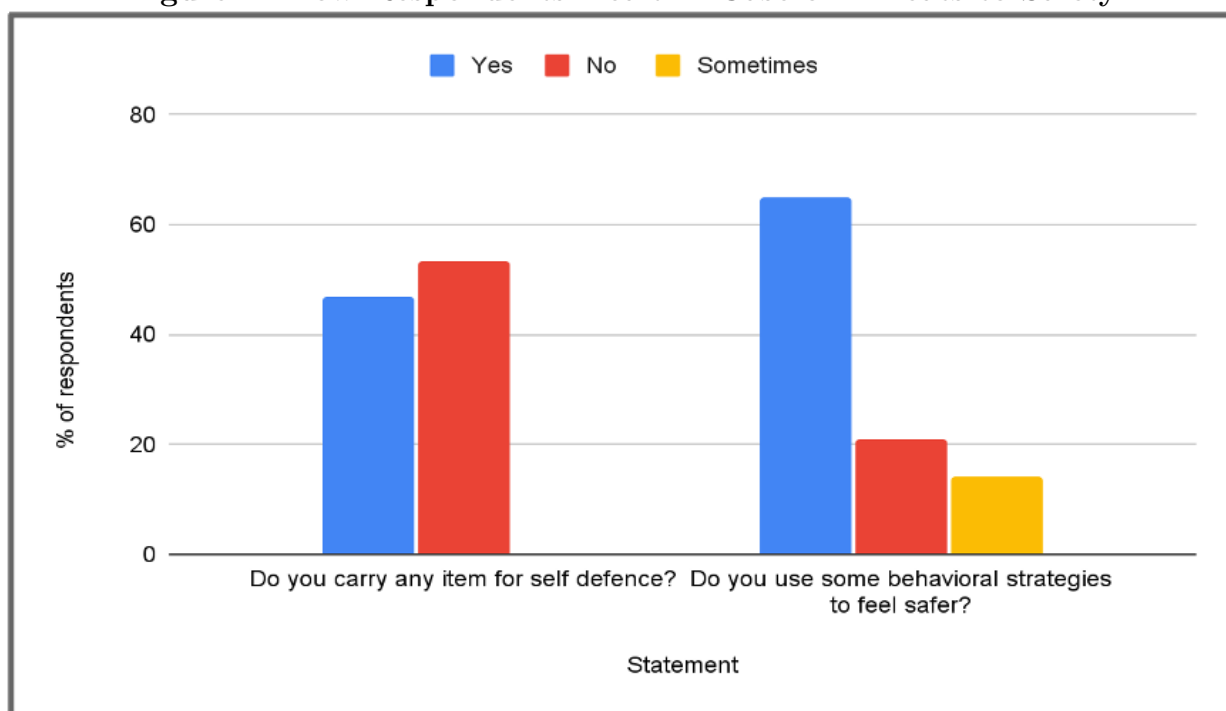
Table 2: Past Experiences

Experience	Yes (% of respondents)	No (% of respondents)
Have you ever faced an attack in the metro	15.8	84.2
Have you ever faced a threat in the metro	35.67	64.33
Have you ever seen or heard others getting threatened or attacked in the metro	64.9	35.1

Source: Survey response.

Amongst those who chose ‘Yes’ on having faced safety issues themselves (threat or attack), the most common methods of dealing with the issue were to (i) *move away from the perpetrator and* (ii) *ignore the incident*. Nearly 72 per cent of victims chose to do either of these. Only a fifth of the victims chose direct confrontation. It is often the case that the victim is not believed when they register a complaint since the burden of proof lies on them. Consequently, they choose to stay silent. Figure 2 gives brief information on measures taken by respondents to protect themselves from safety threats. While a majority of them did not carry an item for self-defence, nearly 65 per cent of the respondents adopted behavioural responses to feeling safer in the metro. The most common tactics used were (i) “covering chest with bag” (ii) “standing next to ‘safe’ people” (iii) “standing near to the door” and (iv) “frequently using a phone”.

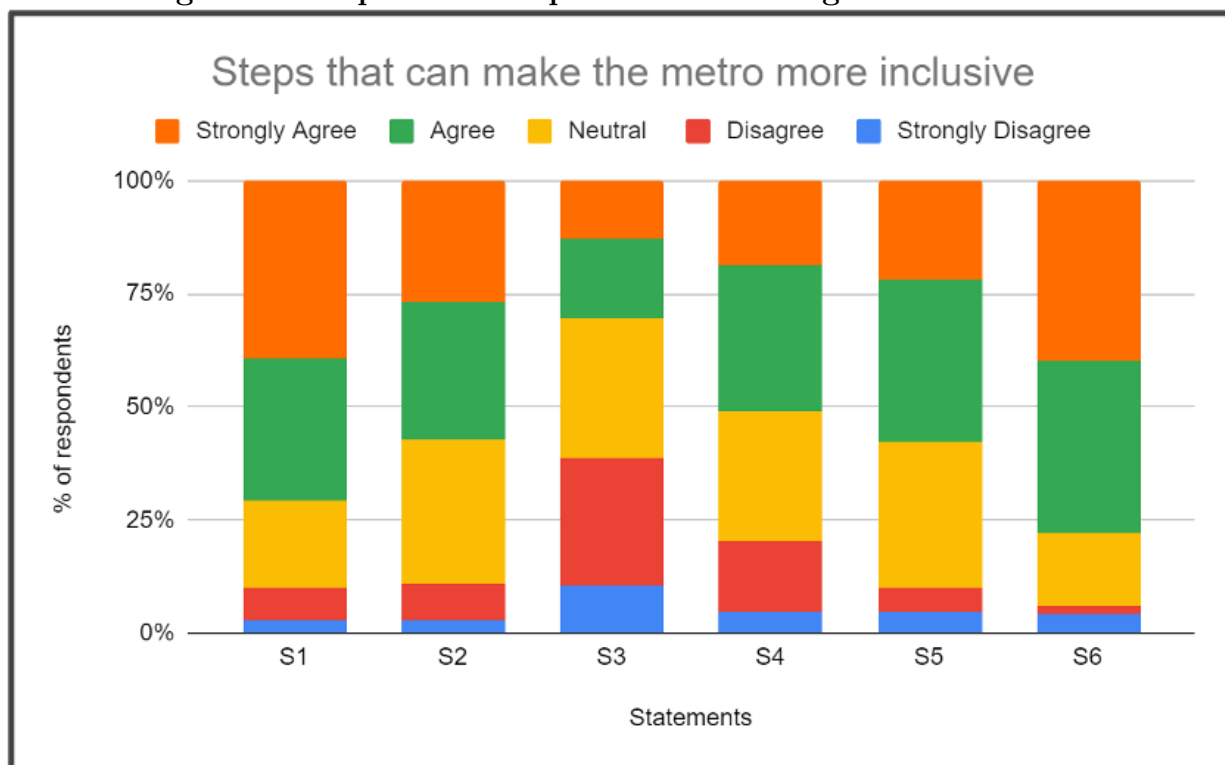
Figure 2: How Respondents Dealt in Case of Threats to Safety



Source: Author’s Visualisation from survey responses.

Respondents were also asked their opinion on some steps that would make the metro safer and more inclusive. Figure 3 presents the results. The statements are in Appendix A.1. Most respondents felt seeing more women as security guards or metro staff would also be beneficial (S5 and S6). They also stated that having a panic button in the general coaches to alert security officials would enhance their safety (S1). While many supported the idea of more reservation of seats in the metro for WGM users (S4), there was not much convincing support for ‘women- only’ metros (S3). Having additional security within the metro cars, particularly at the intersection of the reserved coach and the following compartment (S2) would be useful for safety purposes.

Figure 3: Respondents’ Opinions on Making the Metro Safer



Source: Author’s Visualisation from survey responses.

4.3 Factors Affecting the Perception of Safety

To understand the factors that affect safety levels, I employ ordinal logistic regression analysis. The survey had four questions that directly dealt with the perception of safety. As shown in Figure 1, respondents felt considerably safe in the daytime (Early Morning and Morning). It was only during the Evening and Night time that we see a sizable shift in the feeling of (in)security. Hence, it was decided to keep the safety scores of evening and night time as the 2 dependent variables in the study. Given that these variables are categorical in nature, logistic regression is the most appropriate econometric tool. The use of such a method is common in transport safety research (Verma et al 2020). There is ordinality in the response variables due to which I have chosen the ordinal logistic regression.

The survey contained several questions that might influence how safe one feels in the metro. Based on the past literature and several discussions with some participants, it was initially decided to keep the responses to the questions given in the following table as the independent variables in the study.

Table 3: Description of Variables

Sr. No	Question	Response Type
1.	Have you ever faced an attack in the metro?	Binary; yes or no
2.	Have you ever faced a threat in the metro?	Binary; yes or no
3.	How safe is the route from your home to the nearest metro station is safe?	Categorical; Very Unsafe, Unsafe, Neutral, Safe, Very Safe
4.	Do you agree that there is adequate lighting in the metro and its premises?	Categorical; Strongly Disagree, Disagree, Neutral, Agree, Strongly Agree
5.	Do you agree that there is adequate surveillance in the metro and its premises?	Categorical; Strongly Disagree, Disagree, Neutral, Agree, Strongly Agree
6.	How comfortable are you travelling alone with strangers in the metro?	Categorical; Very Uncomfortable, Uncomfortable, Neutral, Comfortable, Very Comfortable
7.	Which religious group do you belong to?	The group with which respondents identified themselves with
8.	Which social background do you belong to?	The group with which respondents identified themselves with
9.	Do you carry any items for self-defence?	Binary; yes or no
10.	Have you ever heard or seen someone else get threatened or attacked in the metro?	Binary; yes or no

Source: Author's descriptions.

After initial modelling, I dropped the variables regarding adequate lighting, surveillance³ and attacks. This was because including them in various models led to the violation of a key assumption of ordinal regression: proportional odds/parallel regression assumption. Since ordered logistic regression gives us cumulative logits, the underlying assumption is that each independent variable has the same effect on all categories of the outcome. Due to the violation, they were dropped from the analysis.

The dependent variables have 5 levels going from ‘Very Unsafe’ to ‘Very Safe’. Lower categories indicate higher feelings of insecurity. Let us now discuss the independent variables. For my binary responses, I have created dummies. I have coded ‘1’ for ‘Yes’ in all such responses mentioned in Table 3 and allotted ‘0’ for the base category, No. This means, for example, if a respondent said *yes to having faced* a threat in the metro, they have been re-coded as ‘1’. Similarly, if a respondent said *no to hearing or seeing someone else getting threatened or attacked*, they have been re-coded as ‘0’. For the categorical variables too, I have created dummies. For route safety, the base category is ‘*Very Unsafe*’ while for comfort with strangers, the base category is ‘*Very Uncomfortable*’. I have taken 4 dummies for each variable since there are 5 levels in both of them. In total, for route safety and comfort with strangers, I have 8 dummies. For reasons of parsimony, I have combined the responses on religion and social background and created a new variable called Majority⁴ that takes a value ‘1’ when a respondent is Hindu and belongs to the ‘General’ or unreserved category.

Previous research has shown that past incidents can influence how safe one feels in the metro. Therefore, one needs to control for it. Due to this, all models included ‘threat’ as an independent variable. I ran separate regressions with various combinations of independent variables. In total, 5 models were chosen; three with evening safety as the dependent variable and two with night safety. The results from the model including evening safety are mentioned in Tables 4 (a) to (c) and those from including night safety in Tables 5 (a) and (b). For checking the parallel regression assumption, the *omodel* command in Stata has been used. All final models fulfilled the required assumptions (see appendix 7.2). All models are significant (as noted by the LR statistic and the corresponding p-value).

³Questions on infrastructure were included as they were deemed fit due to the literature on the subject. A detailed discussion has been avoided due to space constraints. Information on these variables can be made available on request.

⁴Religions other than ‘Hinduism’ have been categorised as ‘Minorities’ under Section 2(c) of the National Commission of Minorities Act, 1992. I have also included categories like atheists, non-religious etc. under minorities. For social background, individuals who belong to General or Unreserved categories are labelled as majorities due to their relatively higher representation and greater access in public spaces. While one can incorporate the finer dynamics of social discrimination in India in this analysis (even within minority religions, SCs fare worse than those who belong at the top of the caste system), that is beyond the scope of this paper.

Table 4a: Model 1: Dependent Variable - Safety during Evening

Variable	Coefficient	P-value	Odds-Ratio
Threat	-1.034	0.00***	0.355
Unsafe Route	-0.395	0.48	0.673
Neutral Route	0.472	0.35	1.603
Safe Route	0.941	0.06*	2.563
Very Safe Route	1.708	0.00***	5.518
Cut 1	-2.87		
Cut 2	-0.46		
Cut 3	1.22		
Cut 4	3.16		
LR Statistic ($\tilde{\chi}_5^2$)	30.68		
P-value (LR Statistic)	0.00		

Source: Author's calculations.

Notes: P-values: *** significant at 1%, ** significant at 5 % and * significant at 10 %

Table 4b: Model 2: Dependent Variable - Safety during Evening

Variable	Coefficient	P-value	Odds-Ratio
Threat	-1.075	0.00***	0.341
Uncomfortable with strangers	0.877	0.09*	2.404
Neutral with strangers	1.608	0.00***	4.993
Comfortable with strangers	2.221	0.00***	9.221
Very Comfortable with strangers	2.661	0.00***	14.306
Cut 1	-2.078		
Cut 2	0.413		
Cut 3	2.143		
Cut 4	4.107		
LR Statistic ($\tilde{\chi}_5^2$)	39.850		
P-value (LR Statistic)	0.000		

Source: Author's calculations.

Notes: P-values: *** significant at 1%, ** significant at 5 % and * significant at 10 %

Table 4c: Model 3: Dependent Variable - Safety during Evening

Variable	Coefficient	P-value	Odds-Ratio
Threat	-1.004	0.00***	0.367
Self Defence	-0.652	0.02**	0.521
Cut 1	-3.607		
Cut 2	-1.295		
Cut 3	0.300		
Cut 4	2.159		
LR Statistic ($\tilde{\chi}_2^2$)	18.6		
P-value (LR Statistic)	0.0001		

Source: Author's calculations.

Notes: P-values: *** significant at 1%, ** significant at 5 % and * significant at 10 %

Table 5a: Model 4: Dependent Variable - Safety during Night

Variable	Coefficient	P-value	Odds-Ratio
Threat	-0.873	0.00***	0.417
Heard/Seen others get threatened or attacked	-0.732	0.018**	0.481
Cut 1	-1.468		
Cut 2	0.275		
Cut 3	1.693		
Cut 4	2.881		
LR Statistic ($\tilde{\chi}_2^2$)	16.780		
P-value (LR Statistic)	0.000		

Source: Author's calculations.

Notes: P-values: *** significant at 1%, ** significant at 5 % and * significant at 10 %

Table 5b: Model 5: Dependent Variable - Safety during Night

Variable	Coefficient	P-value	Odds-Ratio
Threat	-1.020	0.00***	0.361
Majority	0.309	0.302	1.362
Cut 1	-0.805		
Cut 2	0.904		
Cut 3	2.280		
Cut 4	3.452		
LR Statistic ($\tilde{\chi}_2^2$)	12.25		
P-value (LR Statistic)	0.0022		

Source: Author's calculations.

Notes: P-values: *** significant at 1%, ** significant at 5 % and * significant at 10 %

It is often argued that the interpretation in odds ratio is more intuitive than that from the logit scale. The odds ratio from Model 1 tells us that those who have previously faced any threat have lower odds (less than 1) of being in higher categories of the outcome when one controls for other factors. That is, individuals who have previously faced a threat are *less likely* to feel secure in the metro *ceteris paribus*. The result is statistically significant. For route safety, all comparisons are to be made with reference to those whose route from their home to the nearest metro station is very unsafe. People whose routes are comparatively safer are *more likely* to be in the higher rather than lower categories of the outcome; i.e., they are *less likely* to feel insecure in the metro during the evening. Here, the data shows that the groups whose routes are “Unsafe” or “Neutral” are not statistically significantly different from those whose routes are “Very Unsafe”. The difference steps in only when the route is either “Safe” or “Very Safe”. Model 2 has a similar interpretation in terms of threat. However, it reveals something intriguing in terms of comfort with strangers. Here the base category is “Very Uncomfortable”. The comfort odds ratio suggests that individuals who are comfortable with strangers in the metro have higher odds of feeling safe in the metro. The p-value of each comfort dummy is significant. This implies that people’s comfort level with strangers has a sensitive relationship with their level of perceived safety; i.e., even a small increase in the level of comfort with strangers can improve an individual’s odds of feeling safe in the metro.

Hence, one can say that comfort with strangers is a crucial determinant of how safe one feels in the metro. This result mirrors the findings of Currie and Mahmoud (2013). Model 3 states that those who carry an item for self-defence have lower odds of feeling safe in the metro. This result is rather strange since one would expect that those who carry such an item would have an additional sense of security due to their ability to protect themselves via the use of such an item in case any threat/attack looms. One possible justification for this is that individuals who carry an item might have been influenced by the experiences faced by others. In such a case, they are likely to be more sceptical about their safety in public spaces (like the metro) in the first place. Carrying an item for self-defence in such a case might not be as effective as one would believe. Additional research might be able to throw more light on this aspect. The results are statistically significant.

Models 4 and 5 pertain to safety during night-time. Table 5(a) tells us that respondents who have heard or seen others face a threat or attack in the metro have lower odds of feeling safe. The interpretation of ‘Threat’ in Model 4 is qualitatively similar to the models that used evening safety as the dependent variable: those with previous experience of having faced threats are less likely to feel safe. Model 5 tells us that those who have a majority status (Hindu and Unreserved category) have higher odds of being in higher categories of the outcome; i.e., they are more likely to feel safe. However, the p-value associated with the variable is insignificant at any conventional level of significance. This indicates that there is no significant difference between the majority and minority groups.

5 Policy Suggestions

There is a dire need to improve the security measures of the Delhi metro system to encourage more participation from WGM users. Several ongoing policy measures aim to solve this. Based on the descriptive analysis and regression results presented above, the paper offers the following policy recommendations:

1. A frequent issue that comes up in policy formulation is that of who are the intended beneficiaries. This allows policymakers to choose between either a ‘targeted approach’ (where benefits are to be accrued for a specific category of individuals) or a ‘universal approach’ (where everyone gets the benefits). The results indicate that there is no difference amongst WGM users from both majority and minority groups. Hence, steps undertaken to make the metro more inclusive must follow a universal approach that includes WGM users from all backgrounds.
2. There needs to be a concerted effort aimed towards the improvement of last-mile connectivity from the metro to an individual’s residence. For this, municipal authorities along with the Delhi Metro Rail Corporation need to jointly take proactive roles. Some ways by which this can be achieved are as follows:
 - (a) Starting feeder-bus services in all metro stations for WGM passengers. Greater attention must be laid on stations that lie around the outskirts of the city which are often the most at-risk. While such a program already exists, it is not operational in many areas. Furthermore, it is non-gender-segregated. Since public buses are also a place where they can get victimised and harassed, women-only transport must be organised for their movement.
 - (b) Safety audits for other popular modes of transport that specialise in last-mile connectivity like rickshaws and auto-rickshaws must be thoroughly undertaken. This may include (among other things) police verification of the service providers, increased usage of pink autos (known for having female drivers) near metro areas.
 - (c) Many individuals might prefer to cover the last stretch of the journey using non-motorised forms of transport. This includes modes like walking or bicycling. Towards this, municipal authorities should ensure that the roads connecting metro stations to residential areas are properly maintained. The creation of well-lit walking areas around the station equipped with functional streetlights, among other amenities, must be taken into consideration.
3. Since comfort with strangers has a very essential effect on the perception of safety, certain *nudges* can be employed to relieve them of their discomfort. For this, there is a proposal to employ more women and individuals belonging to gender minority groups as metro staff, refreshment vendors, and cleaning staff. The survey revealed that around 31 per cent of respondents ‘agreed’ and ‘strongly agreed’ that there should be more women as staff. Seeing more women in a space that is heavily populated by men would gradually alleviate their feelings of potentially being victimised and harassed.

4. Existing mechanisms for women's safety must be strictly enforced. More security guards in different parts of the station must be allocated. Steps must be taken to ensure that adequate measures are taken to promote inter-compartment safety, particularly for the first and second coaches in the moving direction.

There also needs to be an improvement in the infrastructural quality of the metro service. Although my regression results did not incorporate this aspect due to statistical reasons, one cannot downplay the importance of good quality infrastructure when it comes to public transport. Improvement in this sense necessitates the provision of ample lighting within the metro premises. In terms of surveillance, regular monitoring of metro activity via the use of state-of-the-art technology must be strictly enforced. However, suitable safeguards and provisions must be in place so that such surveillance measures do not impinge on an individual's right to privacy and allied rights and privileges. Installation of panic buttons in the non-reserved compartments of the metro must also be undertaken. It would alert security officials in the nearest station about any untoward incident so that rapid action can be taken.

6 Conclusion

How safe one feels in a public space has far-reaching consequences on several aspects of their being. It influences their participation in the economy and society around them. This is particularly true for socially-disadvantaged groups. The main objectives of this paper were to understand: (i) the prevalence of fear amongst WGM users of the Delhi metro and (ii) factors that influence the perception of safety. Towards that, I ran a survey and analysed the respondents. The results highlighted in the paper confirm the following: (a) fear is prevalent amongst WGM users of the metro (b) feelings of insecurity in the metro shoot up as evening and night time approach.

The safety level experienced by one in the metro is influenced by many factors. Among them, how comfortable one is with strangers seems a highly sensitive factor. Route safety to the nearest metro also influences how safe one would feel in the metro. Based on these results, policy prescriptions are offered that would be useful in alleviating feelings of insecurity in the metro. There is an urgent need for the Metro Corporation to work with municipal authorities to achieve the greater goal of making Delhi more gender-friendly and inclusive. As for this study, there are a few limitations that future research should tackle. The sample was restricted in terms of demographic variables. Most of the respondents were young, undergraduate students. Given that a significant portion of them often use public transport for meeting their daily transportation needs, I believe this limitation can be excused for this study. Nonetheless, future studies should take into account age-related and employment characteristics. This paper can also be extended by including safety perceptions in varied locations within the station to bring out more meaningful insights. Lastly, the availability of better gender-segregated data will allow researchers to view this issue in a more nuanced way.

A Appendix

A.1 Statements in Figure 3

S1: There needs to be a panic button in general compartments of the metro to alert metro security about an incident.

S2: There should be greater security between the reserved coach and the second compartment.

S3: There should be women-only metros as well.

S4: There needs to be a greater reservation of space for women and gender minorities in the metro.

S5: There should be security officials within the metro car.

S6: Seeing more women as metro staff will make me feel safer.

A.2 Likelihood Ratio Test for Proportionality of Odds Across Response Categories

Model	Chi-Square Statistic	P-value
1	17.23	0.305
2	22.56	0.068
3	5.34	0.501
4	6.24	0.397
5	1.39	0.967

Source: Author's calculations.

The null hypothesis of the test is that the regression lines are parallel. Taking a conventional level of p-value at 0.05, we fail to reject the null hypothesis in any of the 5 regression models. Hence, we conclude that the data fulfils the required assumption.

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