Advancing Women's Participation: Safety Perceptions and Inclusive Cycling in Pasig City

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Abstract: The study examines how women cyclists in Pasig City perceive and navigate safety within an urban cycling environment, recognizing that road safety plays a critical role in shaping cycling behavior. The study employed a mixed method of quantitative and qualitative approach–quantitative approach to capture wider patterns and measurable relationships across the populations of women cyclists and non-cyclists, and a qualitative approach to produce enriched and detailed information of lived experiences and perception of women cyclists. The results indicate that the safety perception of women cyclists is shaped and influenced by infrastructure, socio-spatial norms, and embodied experiences. Physically protected, well-lit, and properly managed cycling infrastructure is essential to increase safety perception and encourage both women cyclists and non-cyclists along with strong governance measures, including anti-harassment policies, road discipline, and monitoring systems, to ensure the intended function of cycling facilities.

Keywords: Active Transport, Gender, Safety

1. INTRODUCTION

1.1. Background

Urban populations are increasing rapidly. In the Philippines, the urban population increased from 29% in 1955 to 45% in 2015, and is projected to reach 60% by 2050 (Napalang, 2016). Although this growth may serve as a driver for further economic development, rapid urbanization also generates greater demand for mobility within cities. Metropolitan Manila is among the regions in the Philippines that faces significant mobility challenges associated with urbanization, including traffic congestion, increasing transport costs for road users, and poor public transport service delivery that contributed to declining ridership (JICA & NEDA, 2014; ADB, 2019). Considering these persistent issues, a more efficient and sustainable transportation system is imperative.

The COVID-19 pandemic and the restrictions imposed in public transportation created a window of opportunity for people to turn to cycling, which sparked the urgency for a cycle-friendly Metro Manila. As the national and local governments secured funding for the installation of bike lane networks and issued accompanying guidelines and policies, the number of cyclists increased significantly beginning in April 2020 (Lacsa, 2021; DILG, 2020). However, this momentum declined as pandemic-related mobility restrictions were lifted, revealing that active transport remains a non-viable option for many commuters due to

inadequate infrastructure and support facilities. The Citizen Bike Count of the Institute for Climate and Sustainable Cities (ICSC) recorded 191,578 cyclists across 10 selected urbanized cities in 2022, which declined to 147,800 in 2023, a decrease of 43,778 (ICSC, 2022; Atienza, 2023). This decline was attributed to unsafe road conditions, poor cycling infrastructure, and encroachment of motorized vehicles in designated bike lanes (Atienza, 2023). Similarly, MMDA data from 2023 reflect a downward trend in the number of cyclists on the road (Ranada, 2024).

A closer look at the composition of people using Metro Manila's cycling lanes reveals another issue underlying the decline in cycling: the larger gender disparity among cyclists. Of the 191,578 cyclists counted in 2022, 96.17% were male while only 3.83% were female. Data from 2021 reported an even lower figure of 3.1% female cyclists (ICSC, 2021; ICSC, 2022). Other research reports a 25:1 ratio of men to women who cycle around the metropolitan area (Gaspay et al., 2022). This overrepresentation of men is also observed in low-cycling countries such as Australia, England, Canada, and the United Kingdom, whereas in high-cycling countries such as the Netherlands, gender differences in cycling participation are far less pronounced (Debnath et al., 2021).

Among the studies examining the factors that influence cycling behavior among women and men, road safety consistently emerges as a key determinant of the lower rate of female cyclists. Although both women and men share concerns about collisions and injuries, women differ in their perception of social and interaction-related risks. Compared with men, women are more concerned about the social dimensions of cycling safety, including being bullied or verbally abused while cycling, experiencing harassment, and interacting with motorists, as well as the quality of cycling infrastructure (Graystone et al., 2022; Funaki, 2019; Monash University, 2023).

In the Philippine context, however, where efforts to promote cycling have largely focused on infrastructure development and gender disparities in cycling persist, women's perception of cycling safety has received limited empirical attention. Existing studies have assessed bikeway safety in crash-prone areas (Camba et al., 2017), discussed the barriers faced by women cyclists in Metro Manila (Cruz, 2017), evaluated women's perceived safety on motorcycle taxis (Napalang et al., 2024), and documented the shift from public to active transport during the COVID-19 pandemic (Gaspay et al., 2022). Yet few have drawn on women's own accounts to understand how they experience cycling networks and how the urban environment shapes those experiences. With cycling infrastructure still evolving, cities such as Pasig, which has one of the more established cycling networks in Metro Manila, have an opportunity to develop more inclusive cycling systems.

This study is grounded in feminist geography, which examines how gender shapes space, place, and identity. Gender is understood as a social relation between men and women that is hierarchical, privileging masculinity while devaluing femininity, and space is not neutral but produced through these power relations (Massey, 1994; McDowell, 1999). Applied to urban mobility, cycling lanes are not neutral technical infrastructure but carry gendered assumptions and social meanings that shape who gets to move, how, and with what degree of safety. Socio-spatial norms influence who is seen as belonging in public space, while women's lived bodily experiences, shaped by expectations about femininity, care work, and vulnerability, affect how they negotiate the street. Sheller's (2018) concept of mobility justice, the right to move with social equity, further highlights how transport systems designed around privileged users marginalize women. The study therefore looks beyond physical infrastructure to examine how infrastructure, socio-spatial norms, and embodied experience together shape women's perception of safety and access to cycling in Pasig City.

Guided by this framework, the study aims to examine how women cyclists and non-cyclists in Pasig City perceive and navigate safety within the urban cycling environment, and how these perceptions relate to cycling participation. Specifically, it aims to: 1) assess women cyclists' safety perception along the dimensions of cycling infrastructure, socio-spatial norms, and embodied experience; 2) examine how safety perception relates to its determinants within and across these three dimensions; 3) identify the infrastructure features that women cyclists and non-cyclists prefer and that would encourage them to cycle; 4) explore women cyclists' lived experiences of safety and the local government's perspective on gender-responsive cycling; and 5) recommend planning, policy, and governance measures for a more inclusive cycling environment in Pasig City.

1.2. Safety Perception and its Determinants in Cycling

Safety has emerged as a central concern in discussions of active mobility as it shapes transport mode choice, travel behavior, and movement patterns, and the decision to cycle among women is closely tied to their perception of safety (Fong et al., 2020; Funaki, 2019; Broache, 2012). Safety extends beyond protection from physical harm, and encompasses security from crime, harassment, and other forms of violence encountered while traveling (Coppola & Silvestri, 2021; Joewono & Kubota, 2006). Women's perceptions of safety therefore encompass two distinct types of risk: the risk of road crashes, associated with aggressive driving and inadequate infrastructure, and the risk of harassment or violence, associated with personal security and unwanted attention. In this study, harassment is defined as gender-based harassment or other unwanted behavior directed at women cyclists by other road users or bystanders, such as catcalling, staring, whistling, or derogatory remarks, while road aggression refers to unsafe or hostile driving behavior, such as blocking, swerving, or tailgating, which lowers respect from motorists and can affect any road user. These perceptions are shaped by objective characteristics of the built environment, as well as by subjective experiences and prevailing socio-spatial norms. The literature points to three interrelated determinants: cycling infrastructure, socio-spatial norms, and embodied experience.

Cycling infrastructure and urban design are key influences on women's perceptions of safety. High ridership among women is associated with protected bike lanes, physical separation from motorized traffic, lower-speed roads, and off-road cycling paths (Debnath et al., 2021; Garrard et al., 2008). Conversely, environments characterized by high traffic volumes, roundabouts with unclear right-of-way rules, multiple conflict points, road construction, steep terrain, and poorly lit or isolated spaces are associated with heightened perceptions of risk, often leading women to reroute, dismount, or avoid cycling altogether (Singleton & Poudel, 2024; Codina et al., 2022; Russell et al., 2021; Fong et al., 2020).

Socio-spatial norms, the shared expectations about gender and about who belongs in public space, also shape safety perceptions. Compared with men, women are more concerned about being bullied, verbally abused, or harassed, and about interacting with motorists (Graystone et al., 2022). Traditional gendered roles, including childcare responsibilities, household errands, and carrying children or goods, further influence women's travel patterns by increasing the importance of convenience and perceived safety in cycling decisions (Emond et al., 2009; Russell et al., 2021; Fong et al., 2020).

Embodied experience, or how women feel and respond to the road in their own bodies, is a third influence. Women and less experienced cyclists generally report feeling less comfortable riding alongside motorized traffic (Bixhaku et al., 2023). Importantly, concerns about aggressive driving, inadequate cycling infrastructure, and personal security often interact, shaping women's everyday mobility decisions. As a result, women adopt various coping

strategies, such as modifying their routes, limiting when and where they cycle, or avoiding cycling altogether, to reduce their exposure to perceived risks (Le et al., 2019; Russell et al., 2021; Fong et al., 2020). While health benefits, environmental concerns, and cost savings motivate women to cycle, these motivations are often outweighed by concerns over personal safety (Broache, 2012).

1.3. Conceptual Framework

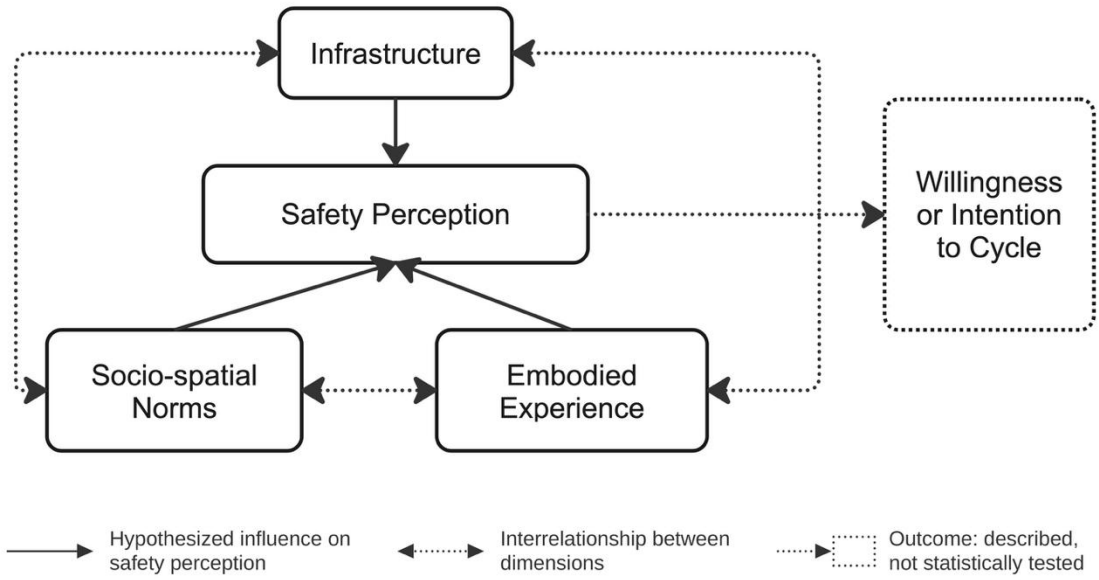


Figure 1. Conceptual Framework (Author's Construct)

The study draws on feminist geography (Massey, 1994; McDowell, 1999) and Sheller's (2018) mobility justice, which hold that urban space and mobility are socially produced through power relations that determine who gets to move, how, and with what degree of safety. Guided by this lens, the framework (Figure 1) centers on women's perception of safety, understood not only as the absence of danger but as the presence of conditions that enable confidence, comfort, and dignity in movement. Three interrelated components are hypothesized to shape this perception: 1) Infrastructure refers to the physical features of the built environment that support or hinder cycling, such as separated lanes, lighting, terrain, road conditions, and markings; 2) Socio-spatial norms pertain to cultural expectations, gender roles, and prevailing discourse on who belongs in public space and the legitimacy of women's mobility; and 3) Embodied experience refers to how the body feels and responds to space, a sensory and emotional response to external factors that is rooted in gender positionality (Sheller, 2018).

Each component is expected to be positively related to safety perception (solid arrows) and to one another (dotted arrows), since physical conditions influence how road users behave and how confident women feel, while norms and personal experience shape how infrastructure is judged. The framework does not assume that the components contribute equally, nor that infrastructure alone determines safety perception. Consistent with studies linking safety perception to the decision to cycle (Debnath et al., 2021; Funaki, 2019; Broache, 2012; Fong et al., 2020; Roy et al., 2024), more favorable perceptions are expected to increase women's willingness to cycle, an outcome that is described, but not statistically tested here.

Section 2 discusses the methodology employed in the study. Section 3 discusses the study's results and findings. Section 4 contains the study's conclusions and recommendations.

2. METHODOLOGY

2.1. The Study Area

Pasig City is one of the seventeen local government units within the National Capital Region (NCR). According to the 2020 Census of Population and Housing, Pasig City had 803,159 residents, of whom 404,348 (50.3%) were women and 398,811 (49.7%) were men, or roughly 99 men for every 100 women (PSA, 2020). The city is traversed by four major urban corridors, Marcos Highway, Ortigas Avenue, Shaw Boulevard, and Circumferential Road 5 (C-5), which serve as key transport routes and host several existing and planned transit-oriented development (TOD) areas, including stations for the Light Rail Transit Line 2 (LRT-2), the Metro Manila Subway (MMS), and the proposed Metro Rail Transit Line 4 (MRT-4).

Pasig City was selected because it has one of the more established cycling networks in Metro Manila while continuing to expand its active transport infrastructure. As of 2023, the city had approximately 57.05 km of bike lanes, the majority of which are Class III shared roadways, while only 9.17 km (16.07%) are classified as protected Class I or Class II facilities. This indicates that most cycling infrastructure in the city remains unprotected. The city also provides 273 bicycle racks across 81 public facilities, including the City Hall Complex, public hospitals, schools, barangay halls, and the Market District. Among its major corridors, Amang Rodriguez Avenue recorded the highest bicycle volumes in 2021, accounting for 22.28% of cyclists during the morning peak and 24.95% during the evening peak, reflecting its importance within the city's cycling network.

2.2. Data Collection and Analysis Method

The study employed a mixed-methods approach to capture both broader patterns in women's perceptions of cycling safety and the lived experiences underlying them. Quantitative data were collected through an online survey of 102 women who had cycled in Pasig City at least once, and a Visual Preference Survey (VPS) of 106 women non-cyclists, which examined intentions to cycle under different street design scenarios and the visual characteristics that encourage or discourage cycling. Respondents to both surveys were recruited online, mostly through sharing the call for respondents to cycling groups and social media. The samples are non-probability, self-selected, and relatively small, and the VPS in particular was intended to explore the environmental features that may influence women's willingness to cycle rather than to produce statistically representative estimates. The findings should therefore be read as exploratory and not generalizable to all women that have cycled in Pasig City. Perceptions are self-reported, and the correlations are cross-sectional. To complement the survey findings, semi-structured interviews were conducted with six women cyclists, selected to represent diverse cycling experience, frequency, travel purposes, routes, and age groups, and with the City Transportation Development and Management Office (CTDMO). The interviews sought to capture the range of women's cycling experiences in Pasig City and how these intersect with the social and spatial factors that shape perceptions of safety.

Survey responses were analyzed using SPSS. Perception items (how safe respondents feel) and determinant items (the factors that shape that feeling) were rated on a five-point Likert scale (1 = strongly disagree to 5 = strongly agree) and summarized using descriptive statistics. Pearson's correlation (r) was used to examine the relationships between safety perception and its determinants, with significance assessed at $p < 0.05$. For the Visual Preference Survey, mean intention-to-cycle scores (1 = very unlikely to 5 = very likely) were compared across street

design scenarios. Interview transcripts from the women cyclists and the local government informant were analyzed through thematic coding, and the resulting themes were compared with the survey findings.

3. RESULTS AND DISCUSSION

3.1 Quantitative Results: Safety Perception of Women Cyclists

A total of 102 women cyclists participated in the survey. Most respondents were between 31 and 50 years old and reported cycling daily or weekly, with more than three years of cycling experience. The majority also typically traveled more than 10 kilometers per trip and most frequently used Class II and Class III bike lanes, which are shared with motorized vehicles but separated through physical barriers or road markings.

The results on trip purposes and motivations suggest that women's cycling behavior is highly multifunctional, serving not only leisure and recreational purposes but also everyday mobility needs. The results also suggest that women who started cycling for leisure purposes shifted to utilitarian uses based on the dominance of leisure or health reasons, indicating that cycling is not viewed as a necessity-based mode of transportation but as an activity that provides mobility, physical activity, and personal enjoyment. This is further supported by the minimal number of respondents who do not have access to a private motorized vehicle and high count of women cyclists who cycle due to traffic jams, limited mobility on public transportation, and view cycling as a cheaper alternative to motorized vehicles. (Figure 2 and Figure 3)

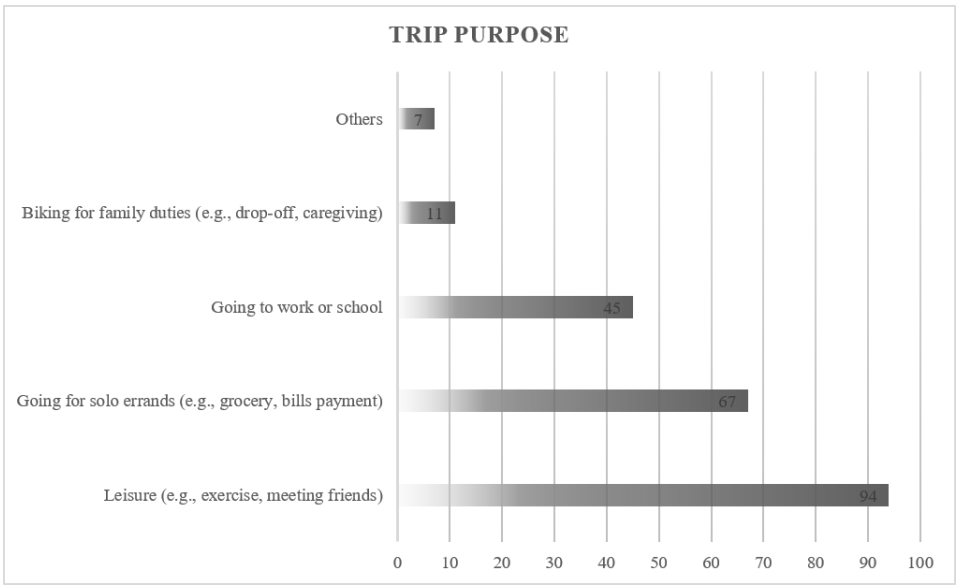


Figure 2. Trip Purpose

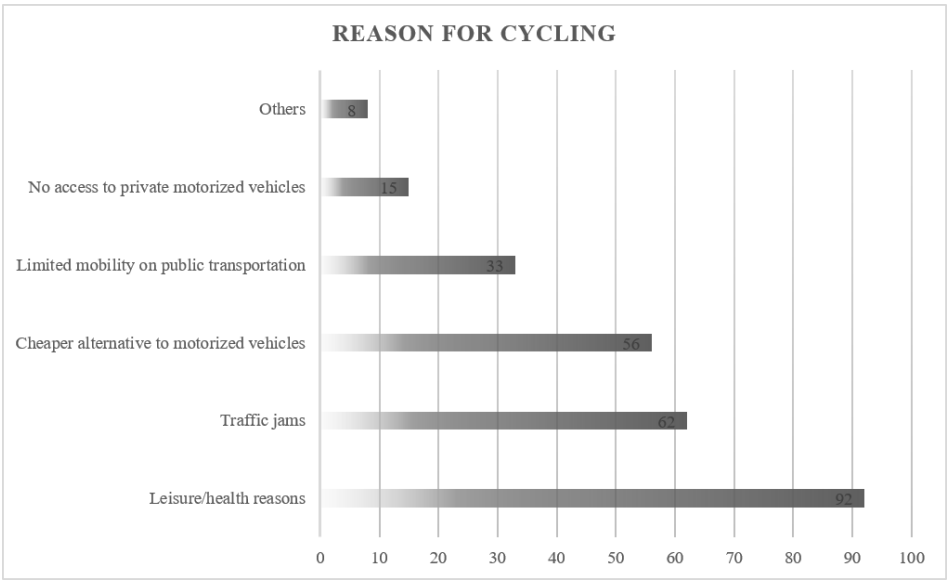


Figure 3. Reason for Cycling

Safety perception was measured along three dimensions: cycling infrastructure, socio-spatial norms, and embodied experience. For each dimension, respondents rated statements on how safe they feel (safety perception) and on the specific factors that shape that feeling (determinants of safety), such as lighting and physical barriers for infrastructure, and companionship and the presence of other women cyclists for socio-spatial norms. Respondents were also asked whether each dimension influences their willingness to cycle. About 94.1% cited that the quality of roads and cycling lanes affect their perception, feeling, or willingness to cycle. On the other hand, about 77.5% perceive that the people around them such as acquaintances, family, friends, or people they encounter when cycling affects their perception of safety. Additionally, 62.7% of the respondents agreed that embodied experience factors affect their perception, feeling, or willingness to cycle.

On the safety perception items, the results of the quantitative survey for women cyclists present that cycling infrastructure supports the perception of safety of women cyclists when these are in good condition, efficient, and optimal. This dimension received the highest mean score of 4.0 and above, indicating a stronger agreement compared to other dimensions. On the other hand, socio-spatial norms scores relatively below neutral reflect that the harassment, judgment, and motorist behavior hinder safety regardless of the quality of cycling infrastructure, affirming that social exposure remains a key risk for women cyclists. Lastly, embodied experiences have a somewhat moderate to below neutral score that reflects women feeling confident but can still be affected by past experiences. While optimal cycling infrastructure supports the perception of safety of women cyclists, variables under socio-spatial norms and embodied experience is still present and affects the overall sense of safety.

The significant correlations between safety perception and its determinants are all positive but weak to moderate in strength, indicating that infrastructure, socio-spatial norms, and embodied experience are related yet distinct constructs, as hypothesized in Figure 1. The strongest relationships across dimensions are between infrastructure perception and the socio-spatial norms determinant ($r = 0.385$) and between socio-spatial norms perception and the embodied experience determinant ($r = 0.340$). Embodied experience perception, however, has a weaker and more selective relationship with the other determinants, as it is not significantly related to the infrastructure or socio-spatial norms determinants.

Table 1. Correlation Between Safety Perceptions and Determinant Dimensions

Perception Dimension × Determinant Dimension	r	p-value	Interpretation
Infrastructure Perception × Infrastructure Determinant	0.209	0.041	Weak positive
Socio-Spatial Norms Perception × Socio-Spatial Norms Determinant	0.300	0.009	Moderate positive
Embodied Experience Perception × Embodied Experience Determinant	0.269	0.032	Weak positive
Infrastructure Perception × Socio-Spatial Norms Determinant	0.385	0.001	Moderate positive
Infrastructure Perception × Embodied Experience Determinant	0.309	0.013	Moderate positive
Socio-Spatial Norms Perception × Infrastructure Determinant	0.210	0.041	Weak positive
Socio-Spatial Norms Perception × Embodied Experience Determinant	0.340	0.006	Moderate positive
Embodied Experience Perception × Infrastructure Determinant	-0.083	0.422	Not significant
Embodied Experience Perception × Socio-Spatial Norms Determinant	0.203	0.079	Not significant

The respondents were asked about their preferred cycling infrastructure measures that would make them feel safe. The top three choices among the respondents were 1) well-protected, dedicated bike lanes not sharing space with motor vehicles, 2) wider (3 meters minimum) and well-lit bike lanes, and 3) interconnected bike lanes throughout the city. These are also the top three choices in the section on infrastructure that still need to be improved or established by Pasig City, implying that the preferred cycling infrastructure features are either not yet in place, or need to be improved to be realized. The most frequent policy or regulation suggested were: 1) strict implementation of road usage (e.g., bike lane exclusivity, traffic rules), 2) strict enforcement of anti-harassment or road safety regulations, 3) early education about active mobility (e.g., biking culture, road sharing). The top three most frequently mentioned can be directly related to the three factors wherein strict implementation of road usage relates to the infrastructure, strict enforcement of anti-harassment or road safety regulations relates to socio-spatial norms, and early education about active mobility can be linked to the embodied experience. All respondents positively answered that if all criteria are met, women cyclists would cycle more often. The collective response emphasized the link between the presence of good quality cycling infrastructure, policies, and other social conditions affirms the willingness to cycle.

The majority or 83.33% of the total respondents cited that safety is not the only factor that they consider when cycling. The most frequent factor cited by the women cyclists is the weather which may include humidity, heat index, unpredictability of weather pattern. This is followed by the complexity of the route to be taken, and the distance of origin to destination. Air pollution was also mentioned by women cyclists, along with health reasons or other physical attributes.

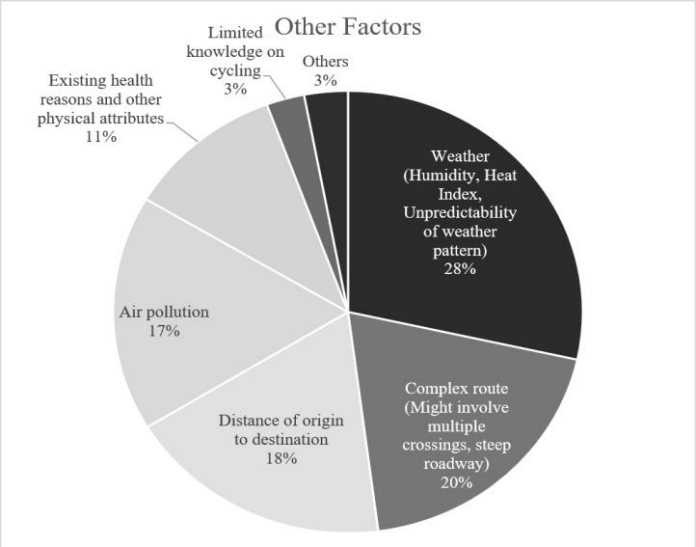


Figure 4. Other Factors that Deter Women to Cycle

3.2 Quantitative Results - Visual Preference Survey For Women Non- Cyclists

A total of 106 women non-cyclists participated in the Visual Preference Survey. Fully separated, shaded, protected bike lanes had the highest mean intention-to-cycle score, followed by well-lit bike lanes and bike lanes with cycling facilities integrated with public transportation, suggesting that physical separation, lighting, and natural surveillance increase women's intention to cycle. Scenarios that relied on companionship rather than infrastructure, such as inclined bike lanes with many cyclists and poorly designed or no bike lanes with cyclists riding in groups, scored below the neutral scale. This indicates that companionship alone is not sufficient to encourage cycling where terrain or infrastructure is poor. A protected bike lane with poor lighting also scored below neutral, suggesting that good lighting has a stronger influence on cycling than physical barriers alone.



Figure 5. Top 3 Cycling Infrastructure Preferred by Women Non-Cyclists

Note: Developed by the author based on the VPS results sourced from Iloilo City of Gastronomy, n.d. and City of London, Ontario, n.d. and Australasian Bus and Coach, n.d

3.3 Qualitative Results – Key Informant Interview with Women Cyclists

The respondents vary in their years of cycling experience and their self-perceived skill level or expertise.

Table 2. KII Respondents Profile

Respondent	R1	R2	R3	R4	R5	R6
Skill-Level	Beginner	Advanced	Advanced	Advanced	Advanced	Beginner
Age Group	31-50	50 and Above	50 and Above	31-50	31-50	31-50
Years of Cycling	5	Over 20 years	25	Over 30 years	Over 10	3
Frequency of Cycling	Occasional	Occasional (Former cyclist)	Daily or weekly	Occasional	Daily or Weekly	Occasional
Purpose of Cycling	Leisure	Leisure (Previously for Commute to work)	Commute to work, solo errands, family duties, and leisure	Mostly leisure (Sometimes commute to work)	Leisure which includes triathlons, criterium races, long-distance cycling, and Audax rides (Previously for Commute to work)	Leisure
Typical Cycling Route (Time, Location)	Either early morning (5AM) or Late at Night (10PM) Route: 1) Eastbank Road - Amang Rodriguez - Marcos Highway 2) Eastbank Road - F. Legaspi - Dr. Sixto Antonio Ave - C5 - Marcos	No specific time Route: Marcos Highway to Katipunan Avenue	No specific time Route: No specific route but passes through Ortigas, Eastbank Road, F. Legaspi, C. Raymundo, Amang Rodriguez (Changes route depending on the purpose)	Early Morning (5AM) Route: No specific route but passes through Ortigas, Felix Ave, Julia Vargas, C5 (Changes route depending on the purpose)	Early Morning (5AM) Route: Dr. Sixto Antonio Avenue- Marcos Highway (Resident of Pasig City)	Early Morning (5AM) Route: Kapitolyo Area - Shaw Blvd / Pasig Blvd - C5 – Ortigas (Resident of Pasig City)

Class I lanes are the safest "on paper" in terms of road safety, but fear shifts once these spaces become isolated, R4 stated: "*My concern shifts from road safety to personal security.*

From fear of getting hit by cars.. to the fear of being mugged when the paths are too quiet or poorly lit." While respondents expressed being constantly on edge cycling in Class 3 cycling lanes. Across the all types of cycling lanes, R3 states it, "*what makes cycling unsafe is not the activity, but rather the environment where people cycle*"

When asked about socio-spatial norms, R3 stated that: "*On a daily basis, I am harassed. On a daily basis. Because anytime anyone does not want to give way to you, or cut you off, it's a form of harassment*". R3's account illustrates how women cyclists experience road aggression and harassment as a continuum, in which being cut off or blocked is read as an act of hostility toward them as cyclists. R1 believes that many drivers attempt to be respectful but struggle under congested conditions, where heavy traffic triggers changes in driver behavior, resorting to aggressive swerving, honking, lane cutting, forcing cyclists aside, just to escape the heavy traffic. R5's interaction with the social environment is also closely tied to the awareness of those around her. She is frustrated when road users, whether motorists, fellow cyclists, or pedestrians, lack basic road knowledge. For her, the absence of shared understanding increases danger and negatively affects her cycling experience.

On embodied experience, For R1, confidence is closely tied to perceived skill level. As a beginner, cycling in a chaotic environment makes it difficult for her to remain calm and relaxed. She describes having to manage multiple physical and cognitive demands at once. Comparing it to R6 who is also a beginner cyclist, R1 has a less perceived safety since R6 was an avid motorcycle user. R1 also cited that terrain also shaped her sense of bodily control. It was not because she cannot climb sharp inclines, but rather because stopping and starting again feels physically difficult and risky. In contrast, R3 expressed concern when cycling downhill, describing concern linked to her light body weight and the feeling that she might fly. Despite the light physique, R3 considers herself physically capable since she can lift her bicycle onto curbs when needed. For her, confidence is not only from physical fitness, but also knowledge of the road and how to navigate it. While R4 acknowledges the importance of physical fitness and knowledge of the road to build cycling confidence, hers comes more from being prepared, emphasizing the importance of having a Plan B, such as anticipating flat tires or injuries, or being in areas where she can easily book a GrabCar if something goes wrong. Further, R4's confidence is connected to visibility and social presence, feeling safer when riding in well-populated areas where she knows she will be seen and where other cyclists are present, reflecting a sense of "safety in numbers". Connecting to her experiences, R1 highlights that it was not the "huge" moments, but the little inconveniences she encounters on the road, specifically stating: "*It doesn't take a traumatic experience to shape preference and cycling behavior, but just the little persistent things you want to avoid entirely*."

Relating to other factors influencing cycling beyond safety, respondents have varying responses. For R1, safety remains to be the top factor she considers in cycling but mentioned that since she cycles for leisure, comfort is also crucial. R3 did not mention any other factors aside from safety that deter her from cycling, but also acknowledges that other women have different mindsets, such as weather, appearance, storage, and parking facilities for bikes. R2 considers the weather, items that she needs to bring, and personal appearance after cycling. She emphasized that one of the major deterrents for her is the need to be presentable as cycling as a physical activity makes her sweat. Similarly, R4 also mentioned weather as another factor for cycling as it affects her appearance or presentability when she arrives at her destination and also makes the maintenance of her gear more tedious when it rains.

All respondents emphasized that protected lanes make them feel safer but vary on the type. For both R1 and R2, they suggested off-road pathways that have open spaces, wider roads, scenic views to encourage them to cycle more frequently and confidently, and ensuring that these pathways are connected through major nodes in the city. R3 and R4 however view that

the design and style of bike lanes developed in Julia Vargas is the best infrastructure for them where having physical segregation or concrete barriers makes them feel safer. Beyond the physical barriers, the abundance of trees provides natural canopy and a sense of thermal comfort. Julia Vargas Ave has also been cited by several respondents in the quantitative survey as one of the best practices being done by the city. R3 on the other hand relates to cycling lanes to be more direct and interconnected, that as a mother, women tend to move differently. Mothers are always on the go, whether going to work or doing familial responsibilities such as grocery shopping. For R2, policies on developing cycling culture is crucial, citing examples from Japan that trains children early on to become a part of their identity. R2 and R3 additionally focused on policies that these pathways should be solely for cyclists. Sharing it with any motorized vehicle poses a threat to safety due to differences in speed and maneuvering

The respondents explicate that experience builds confidence, improves situational awareness, and reduces fear. The lack of experience leads to anxiety and avoidance of conflict areas. Protective bike lanes are perceived as the safest cycling lane based on the Department of Public Works and Highways (DPWH) bike lane category. The poor design, lack of maintenance, and road user behavior reduces the effectiveness and the sense of security of cyclists. Women cyclists frequently experience harassment, aggressive driving, and lack of respect from motorists. Emphasizing the feeling of vulnerability among the cyclists. KII respondents describe cycling in urban environments is mentally demanding. Requiring constant awareness of traffic flow, road hazards, and other road users along with the confidence influenced physical ability and past experiences. The respondents highlight different coping strategies to maneuver through the built urban environment such as choosing safer routes and cycling time. Respondents cited the need for systemic improvements.

3.4 Qualitative Results – Key Informant Interview with Pasig Local Government

The interview with the local government states that active transportation in Pasig City is institutionally supported through the City Transportation Development and Management Office (CTDMO). However, gender specific data are still limited. Available data indicates that cycling in Pasig City is a predominantly male dominated transportation mode. The active transportation specialist mentions that during the COVID-19 pandemic there was an observed increase in women's participation in cycling due to the restriction on public transportation services. Although the lack of protected cycling paths was cited as one of the most common safety issues in the city post-pandemic. Women are put off navigating through the roads with mixed traffic without proper infrastructure systems in place.

In 2021, 2022, and 2023, the city has conducted workshops and training for traffic enforcers to protect vulnerable road users that includes women, children, and senior citizens. Enforcers were informed with knowledge on different transportation policies and priorities of the local government in pushing for cycling as a sustainable mode of transportation, not just as an alternative but as the primary mode. The CTDMO highlights that as early as 2011, the city has already been promoting the use of bicycles with the enactment of the Pasig City Bicycle Ordinance No. 13 Series of 2011.

The CTDMO admits that the existing cycling infrastructure in the city is still not gender sensitive or equitable for women, citing a scenario for a beginner cyclist, the current infrastructure system is unsafe, motorized vehicles such as motorcycles can still enter the bike lanes, some pedestrians would also use the bike lanes since they also don't have spaces to walk on, and cars use bike lanes as parking are all existing reasons that defeat the purpose of the lanes. Various challenges arise from developing equitable cycling infrastructure in the City, including institutional challenges, monitoring of existing cycling infrastructure, resource

constraints, and social behavioral change.

3.5 Discussion

The three dimensions in the conceptual framework (Figure 1) are interrelated, most notably infrastructure with socio-spatial norms and socio-spatial norms with embodied experience (Table 1), affirming that safety perception is multi-dimensional. The qualitative results support the survey finding that cycling infrastructure is a primary factor in women's perception of safety, while also providing detailed narratives on how infrastructure, socio-spatial norms, and embodied experience interact.

The survey shows that socio-spatial norms and embodied experience are linked, reflecting that external factors such as road user behavior and exposure to other cyclists are connected to women's personal confidence and comfort. About 75.5% of respondents reported being harassed, consistent with the interviews, in which even long-term cyclists experience harassment regularly. Connecting to feminist geography, harassment is not an isolated incident but an expression of unequal power relations in public space (Massey, 1994). Road space is organized in a hierarchy that prioritizes motor vehicles and, within it, positions women cyclists as less entitled to occupy it, which helps explain why harassment persists even where cycling infrastructure is rated favorably. This is consistent with Coppola and Silvestri (2021), Joewono and Kubota (2006), Graystone et al. (2022), Gaspay et al. (2022), and Khademi (2024), who found that safety concerns extend beyond crash risk to the risk of harassment.

Embodied experience in both surveys presents a critical factor to the safety perception of women cyclists. However, there are variations in the perception of safety depending on their differences in personal confidence, comfort, and ability. The findings from the quantitative and qualitative survey suggest that embodied experiences have a higher variability among the factors that affect safety perceptions. Embodied experiences can be related to years of experience of a cyclist, frequency of cycling, previous cycling incidents, physical condition among others. The results present that safety is not a fixed state and varies depending on the urban environment, external factors, and personal condition of a woman cyclist.

Highlighting that both women cyclists and non-cyclists feel safer in protected cycling paths, good cycling infrastructure alone will not encourage women to cycle. Because the three dimensions are interrelated, physical measures must be paired with a strengthened governance mechanism that regulates the designated space and monitors road user behavior, informed by an understanding of women's varied embodied experiences**.**

4. CONCLUSIONS AND RECOMMENDATIONS

4.1 Conclusion

The study examined how cycling infrastructure, socio-spatial norms, and embodied experience shape the safety perception of women cyclists in Pasig City. The findings present that cycling infrastructure is the strongest factor. It received the highest ratings among the three dimensions, and both women cyclists and non-cyclists preferred fully separated, well-lit, protected cycling lanes. Protected lanes with poor lighting were rated lower, which shows that physical barriers alone are not enough. However, infrastructure is necessary but not sufficient. The results from the quantitative survey show that socio-spatial norms scored below neutral regardless of the quality of cycling infrastructure, and about 75.5% of women cyclists reported being harassed, including long-term cyclists. The narratives also show that protection changes the nature of fear

rather than removing it, as R4 cited that on Class I lanes her concern shifts from crashes to personal security when the paths are quiet or poorly lit. Further, the three dimensions are related but distinct. Infrastructure is most closely linked to socio-spatial norms, and socio-spatial norms to embodied experience, while embodied experience varies the most among women depending on skill, confidence, and past experiences.

These findings highlight that the safety of women cyclists is not only a matter of physical design but also of how road space is governed and shared. The local government acknowledges that the existing cycling infrastructure is not yet gender sensitive, as motorcycles, pedestrians, and parked vehicles still use the bike lanes, and that gender specific cycling data are still limited. The respondents likewise recommended strict implementation of road usage, enforcement of anti-harassment and road safety regulations, and early education on active mobility, which correspond to the three dimensions examined. All respondents stated that they would cycle more often if these conditions are met, although weather, route, and distance also affect their decision to cycle.

Through the lens of feminist geography, women's cycling reflects unequal access to and control of public space, and women's mobility differs in purpose and demands, as seen in the travel patterns of mothers. Advancing women's participation in cycling therefore needs integrated measures: protected and well-lit cycling infrastructure, governance that regulates road space and addresses harassment, and support that considers the varied embodied experiences of women. Cycling should also be part of the entire transportation system, supported by efficient public transportation and equitable pathways for pedestrians and cyclists.

4.2 Recommendations

Based on the results of the surveys conducted, several recommendations are proposed to pursue the development of an inclusive and gender responsive cycling environment in Pasig City. The adoption of an inclusive and gender responsive mobility framework should start by developing a gender disaggregated cycling database that includes bike count, incidents of accidents and harassments along with the conduct of a women mobility survey. Further, the local government could also formulate a city cycling network review and phased development plan which includes the comprehensive review of roads and mapping that contains the inventory of road width per segment, traffic volume, average speed per type of vehicle, lighting conditions, and overlay of essential socio-economic centers. The proposed plan should integrate a low stress network approach. The institutionalization of the framework can reflect measures such as requiring all cycling infrastructure to conduct a gender safety review or audit before implementation.

The development of safe cycling infrastructure in Pasig City should prioritize the expansion of protected bicycle infrastructure, particularly DPWH Class I and physically separated Class II bike lanes, along major transport corridors and high-volume roads, ideally interconnected to the proposed train stations in the city, major social support facilities, and other major thoroughfares. Additionally, within the short-term period, the existing painted bike lanes should be upgraded with physical barriers to improve cyclist safety and reduce conflicts with motorized vehicles. Further, additional investments in street lighting and nighttime visibility measures should be incorporated into cycling infrastructure projects to enhance cyclist security and usability during evening hours. Additionally, natural canopy from trees and other greenery should be in place in the cycling infrastructure to combat heat index. This cycling infrastructure should be interconnected, with a minimum of 3 meters as compared to the minimum clear width set by the DPWH of 2.44 meters and have road level crossing to cater to women who may not be able to carry or maneuver their gears on elevated crossing.



Figure 6. Sample of a Safe Cycling Infrastructure
Source: Buehler & Pucher, 2022

Cycling culture is defined as a combination of shared social norms, attitudes, and daily practices supported by physical and institutional mechanisms that make cycling a routine and an accepted normal mode of transport (Miranda et al., 2021). Although the local government recommends a massive information, education, and communication campaign for awareness of the benefits of cycling, the development of a cycling culture is essential to a sustainable and inclusive mobility change. Cycling culture initiatives can include school-based cycling programs by integrating cycling education and road safety into early education curriculum. Another initiative is the reorientation of drivers or re-evaluation of road safety training modules to include road sharing practices. As part of the initiatives, the local government is also recommended to adopt cycling as part of the governance culture.

Lastly, the study recommends additional studies and research that includes additional factors, variables, or comparative studies on different locations. Further, studies may include the identification and analysis of factors that affect the viability of current roadways for the implementation of inclusive cycling infrastructure which can include road width, traffic volume, land use classification, road quality, and institutional capacity for redesign and enforcement. Additional studies may also focus on the relationship between cycling and climate-resilience within the local context to understand how women perceive and respond to extreme weather events such as high heat index and heavy rainfall that can result in flooding. The study may examine how these climate related factors affect the safety and comfort of women cyclists.

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