SCIENTIFIC OASIS

Journal of Operations Intelligence

Journal homepage: www.jopi-journal.org
eISSN: 3009-4267

The Effects of Public Transit in Vehicle Safety Measures for Women on Gender Equity

Ilgin Gokasar[1,*], Gülin Göksu Başaran[1]

[1] Department of Civil Engineering, Bogazici University, Istanbul, Turkiye

ARTICLE INFO

Article history:
Received 5 January 2025
Received in revised form 11 March 2025
Accepted 19 April 2025
Available online 23 April 2025

Keywords:
Public Transit; In-vehicle Security; Autonomous Vehicles; Gender Equity.

ABSTRACT

Security-related risk perception significantly influences passengers' travel decisions, yet current security infrastructure in public transportation fails to equally address the safety needs of men and women. Research indicates that women experience criminal and violent acts more frequently in public transit despite existing security measures, leading to behavioral adaptations such as trip avoidance, mode shifts, or destination changes. These adjustments create barriers to accessing jobs, education, healthcare, and social services, ultimately undermining transportation equity. This study examines the relationship between in-vehicle security applications and gender equity through a literature review of global and Turkish implementations, assessing their effectiveness in promoting equitable transit access. Additionally, the potential future impacts of autonomous vehicles on in-vehicle security are explored. The paper concludes with policy recommendations to enhance security infrastructure while advancing gender equity in public transportation.

1. Introduction and Motivation

Risk perception and fear can have a significant impact on passengers' travel pattern, mode and route choice, limiting their freedom to move freely [1]. The possibility of experiencing criminal or anti-social behavior is higher in public transportation compared to private modes [2].

Women have less access to private car ownership and depend heavily on public transport to cover longer distances in complex paths [3, 4]. It can therefore be said that due to high exposure to criminal acts such as harassment, theft and sexual assault, women tend to modify or constrain their mobility and, in some cases, completely avoid travelling [5-7].

Multiple studies present surveys and interviews addressing women's perceived security in public transport and mentioning the measures they take to protect themselves. In a study [7], it is shown that more than 30% of the 402 women participating in the survey in Vienna, Austria had experienced harassment and 39% of these situations occurred in public transport. It was seen that most of the

* *Corresponding author.*
E-mail address: ilgin.gokasarl@bogazici.edu.tr

https://doi.org/10.31181/jopi31202540

incidents in public transport took place in the vehicle (71%) [7]. A research conducted in Chennai, India shows that 42.8% of the surveyed women believed that buses and trains were the worst modes for personal security. As a self-protection method some of the participants preferred to travel in groups and carry weapons [8]. Another survey highlighting the security risks for women in transportation was carried out across all districts of Delhi, India. As a result of one-to-one interviews with 3000 respondents it was observed that 90% of women encountered some type of harassment while travelling. Similar to the findings of Mitra-Sarkar and Partheeban, it was seen that more than 65% of the women took precautionary measures such as carrying weapons. 57% of the women mentioned that they avoided travelling alone at evening hours and 28% would travel only in the case of an emergency [9]. Along with those mentioned, many other scholars have contributed to the literature with studies highlighting the significant levels of violence women face in public transportation [10-13].

A typical transit trip can be broken into three parts: surroundings of the facility or stop, facility or the stop itself, and the vehicle. Studies show that passengers feel safer inside the vehicle compared to the two other parts [4]. Even though the vehicles are perceived to be safer, it is a must to implement security measures.

Transport authorities are enforcing passive and active in-vehicle security measures such as implementing CCTV and emergency panic buttons, introducing women-only vehicles and carrying out public awareness campaigns to improve risk perception in public transportation across the world. As these measures fail to provide a persistent improvement in women's sense of security, a risk of social and economic exclusion arises, making it a must to address equity in public transportation. Litman [14] describes equity as "the distribution of impacts (benefits and costs) and whether that distribution is considered fair and appropriate" and mentions that transportation is a key factor for people's access to economic and social opportunities [14]. Limitations in mobility due to anxiety and fear therefore disrupt equity. It is clear that there is a need for new measures with an ability to ensure equal access for men and women.

New technological developments in the field of transportation have the potential to result with more secure vehicles. Autonomous vehicles (AV) could be one such development and are expected to enter the market within the next 5 to 10 years. They are likely to generate a transformation within the transportation system, affect the society as well as the environment [15,16]. There are multiple studies regarding their contribution to road safety, economic impacts, ethical concerns etc. However, their impact on personal security with relation to gender equity is yet to be investigated.

This research investigates the women's perceived security in public transportation through mentioning the current measures against women's victimization in public spaces. The aim of this study is to provide solutions for women's issues related to security in public transportation following an equitable approach. This aim is achieved through providing

i. in-vehicle safety measures for women in public transit used in Turkey and all over the world.
ii. a discussion of measures within the frame of gender equity.
iii. possible future effects of autonomous vehicles on gender equity in public transits.

In the light of the provided information and discussion, the study is concluded with policy recommendations for policy makers, transport authorities and the media.

2. In Vehicle Safety Measures for Women in Public Transit

2.1 Examples from Across the World

Throughout the world, women are mostly frequent and regular users of public transport. Fear of victimization and crime resulting in feelings of insecurity is quite widespread among women. Fear of

crime surveys report that women are more fearful of crime than men [17] and they feel unsafe while using public transit more than general community [18]. It has been also argued that perceived violence constraining women's mobility is a form of gender inequality embedded within the public transit system [19-21].

Some in-vehicle applications such as close circuit television (CCTV) systems and active surveillance by police officers or transit operators' staff are applied commonly worldwide in order to ensure the security of all passengers. Panic buttons on buses, implemented in New Delhi, could be given as another example. Another solution is the request-stop programme, offered in Toronto and Montreal, where people are allowed to exit buses at locations other than designated stops.

A number of implementations specifically towards women's transit safety have been developed especially in Third World and developing countries. European and other developed counties have argued that the implementations against women's victimization in public transits do not solve those problems [22,23].

Gender segregation in public transit vehicles is a commonly implemented measure across the world. Female-only carriages having a color of pink and "Women Only" stickers were introduced in Japan in 2000 resulting in lack of sexual harassment in metro and the carriages become a part of the Japanese culture. The implementation is used especially during the peak hours between 7am and 9am.

In 2006, Rio de Janeiro introduced women-only carriages on commuter and metro trains; however, it was difficult to maintain the application as men did not follow the rules of the women-only carriages.

Mexico City also began implementing metro carriages for women and children in 2000; therefore, few cars are reserved for both women and children while the rest of trains are mixed. Pink taxis are also used in the city of Mexico in which alarm buttons are available and the drivers are also women [24].

Jakarta has used the female-only train carriages with orange and pink-seats located at the front and rear of trains. However, mixed trains were full while the female-only carriages were largely empty within peak hours; therefore, female-only carriages were converted back into mixed spaces to accommodate passengers [24].

Gender segregation in the Cairo metro system in Egypt has been going on since 1989. The 4th and 5th cars located at the middle of the train are reserved for women's use only. The city also offers a pink taxi application with female drivers.

Woman-only wagons are also implemented in India under the police control. If one does not comply, they're forced to pay a fine and can be taken to a police station. Pink taxis with women drivers are also used in India by most of the Indian women [25].

Women safety has become the utmost priority of the Indian government considering the increasing cases of crime against women. There are various safety apps designed for the protection and security of women which send emergency alerts to chosen people and also let people know about women's whereabouts under emergency conditions. The security apps for women are supported by the various states' police just to ensure the safety of women and senior citizens. The apps also record sounds and take photographs during the panic situation and transfer these to the police as well [26].

Since 2014, women-only carriages having dark pink curtains are used on the most important three trains in Thailand.

The metro subway of Tehran in Iran reserves few wagons for women and has become an accepted part of the culture. Following the metro application, in 2006, gender-segregated buses with female drivers were also introduced in Tehran.

Since 2016, a car sharing programme called Riding Pink is in action to make transport safer for women and children in Malaysia.

Similarly, SheSafe was launched in 2016 in Australia as a car sharing application and could be used by women and children under twelve years of age in order to provide security against harassment.

The women-only measures against the violence in public spaces towards women in the world are presented in the following table indicating the on-going (O) and canceled (C) implementations (Table 1).

Table 1
Measures against the Violence in Public Spaces Towards Women in the World

Country	Precautions	Year	On-going / Cancelled
Japan	Pink Wagon	2000	O
Brazil	Pink Wagon	2006	O
Mexico	Pink Wagon	2000	O
Mexico	Pink Taxi	2008	O
Indonesia	Pink Wagon	2012	C
Egypt	Pink Wagon	1989	O
Egypt	Pink Taxi	2015	O
India	Pink Wagon	2009	O
India	Pink Taxi	2012	O
Thailand	Pink Wagon	2014	O
Iran	Pink Wagon	2000	O
Iran	Pink Bus	2006	O
Malaysia	Traffic Application (Riding Pink)	2016	O
Australia	Traffic Application (SheSafe)	2017	O

2.2 Examples from Turkey

Past research has indicated that the experience of a woman traveling in her city is dramatically different from that of a man in the same city. The fact that women are subjected to violent acts everyday around the world reduces their freedom of movement as well as their willingness to use public transportation. Concerns regarding violations of women's safety have been foregrounded in Turkey; therefore, several precautions have been taken against violence in public spaces towards women.

CCTV systems are embedded in vehicles across the country and active surveillance is carried out occasionally. Along with these measures, gender-segregated vehicles are also introduced in some cities.

Women-only buses called "Pink Buses" are operated in the city of Sanlıurfa. The Pink Bus serves only women students. Their route is starting from the girls' dormitory and ending at Harran University. The non-stop pink buses having a capacity of 150 passengers provide fast and more comfortable facilities for female students. USB connectors are present for charging mobile phones and wireless internet connection is also available in the bus.

Another precaution taken is a wagon for metro users where women are prioritized implemented in the city of Bursa. The metro wagon is used by both female and male passengers; however, women having priority when riding and the priority is specified by means of implementing warning signs at each station. Dedicating some carriages to only women was also suggested; however, it was later cancelled due to resistance from the citizens.

"Pink Trambus" which serves only women is used in the city of Malatya. The drivers of trambus are also women and most of the commuters are satisfied with the implementation while some of them make complaints towards the woman only usage.

For the city of Istanbul, "Pink Metrobus" was thought to be implemented and the necessary feasibility study was completed. However, considering all implementations in the world and taking into account both disadvantages and advantages, the Pink Bus Project was not deemed to be applicable for commuters of the city.

The measures against the violence in public spaces towards women in Turkey are presented in the following table in which indicates the on-going (O) and cancelled (C) implementations (Table 2).

Table 2
Measures against the Violence in Public Spaces towards Women in Turkey

Province in Turkey	Precautions	Year	On-going / Cancelled
Sanliurfa	Pink Bus	2015	O
Bursa	Pink Wagon	2017	C
Malatya	Pink Trambus	2017	O
Istanbul	Pink Metrobus	2017	C

3. The Effects of in Vehicle Safety Measures for Women in Public Transit on Gender Equity Results

Beyazit [27] describes equity as (also known as justice) "fairness in the physical distribution of goods, accessibility for people, affordability of all types of services and distribution of other gains (such as increases in land and property prices)" in transportation. Equitable applications should prioritise those with the greatest need rather than serving equal treatment to all [28]. Instead of considering the needs of each vulnerable group separately, an intersectional approach including categories such as ethnicity, sexuality, disability, class and gender should be followed in order to effectively address inequalities lying in the field of transportation [29]. Failing to engage in equitable transportation planning activities carries the risk of exacerbating the existing differences by placing further financial, environmental and social burdens on the aforementioned categories such as external costs, pollution and social exclusion [14,29].

Social exclusion implies hindered access to job opportunities, education, healthcare and social services for vulnerable groups such as low-income users, minorities, people with disabilities and women [29,30]. The fact that transportation is a highly gendered space makes it a must to focus on gender equity. Women and men have very distinct travel patterns, mode choices, they cover different lengths at different times of the day and women are usually accompanied with a dependent passenger [6,31]. It is also known that women's access to private transportation modes is significantly less than men's, making women depend heavily on public transportation [31,32]. The dominant male view in the public transportation unavoidably results with implementations failing to consider the needs of women and creating a barrier against their social inclusion [33]. The SIDA Guideline for Gender Mainstreaming states that the needs of men and women should be equally considered in decision-making processes [34]. Risk perception has an inevitable influence especially on women's travel decisions and it is therefore worthwhile investigating how the current personal security applications are linked to equity in transportation.

One study showed that men and women often have different preferences for safety measures. Findings of a number of countries indicated that women preferred more staff for surveillance on buses, while men favored CCTV. In general, men tend toward technological solutions, while women feel more reassured by a human presence. Women also specified regarding the CCTV that video-operated surveillance doesn't help victims of crime at the time the incident is happening [26]. Although it is difficult to reach to a statement regarding these measures' impact on equity, it could be argued that there is a gender-based difference in the suitability of security applications. Solutions

such as panic buttons and request-stop programmes appear to be less gendered and low-cost. It could therefore be argued that these measures favour a high share of passengers.

The previous section has also presented examples of women-only transportation implementations from across the world along with detailed information on Turkey. It is seen that transportation authorities in several countries have relied on this measure as a solution to women's security issues. However, some scholars argue that it cannot provide a permanent solution and, in some cases, might lead to a misconception that women should be segregated from the others in order to be safe and give up on their equal mobility rights [4,35].

Dunckel-Graglia [5] focuses on the case of Mexico City where the women-only carriages in the metro system have been operating since 2000. The research consists of 3 years of ethnographic research, a public opinion survey and 250 online comments made by Mexican citizens on the issue. Results show that women are generally in favour of the application as they feel targeted in public transportation, are aware that this issue is a result of gender inequity and require a safe space. However, men find this solution unnecessary as they de-gender the issue claiming that public transportation is dangerous for everyone, not just women. The author explains the negative comments as "a predictable reaction when attempting to change the culture of a place" which is known to be masculine. The article also mentions a project carried out by INMUJERES and the National Board for the Prevention of Discrimination, emphasizing the little change women-only transit systems have achieved, demanding further action.

Cairo is another city where women-only cars were introduced in response to sexual harassment as mentioned earlier. In their research Tillous and Gillot [36] interview members of the Basma movement (founded in 2006 with an aim to ensure safety for everyone) on the segregation in Cairo. The members mention that they find segregation unrealistic and abnormal as women and men have to live together in all areas of life. They are also warning that if the scope of this application extends to other vehicles, it might even reach to the point of separating the streets.

In light of both academic and public opinions it could be argued that women-only transportation systems appear to have positive and negative aspects. On the bright side, these vehicles provide a useful daily solution by creating a safe space until change is achieved in a greater sense. Furthermore, they have the potential to make women's security problems more visible and generate public awareness by leading people to question why such an implementation is in action.

However, they do not have the power alone to completely remove the security risks for women or the deeply embedded gender division in the system. On the contrary, from a broader perspective it could be seen that they could lead to further segregation and additional limitations in women's mobility might occur.

Even though this measure is implemented as a solution to what's seen as women's issue, it will have different implications on women based on their location, income, travel patterns, etc. If women's travel is limited to the presence of women-only vehicles, for example those living in areas where the service is not available or those commuting outside the rush hours to go to work, school, hospitals etc. will not have equal access. Similarly, if they experience a violent act in a mode other than the women-only vehicle, they will face the risk of being blamed for choosing the wrong mode of transportation as their safety cannot be guaranteed on these vehicles. The fact that there is a measure in action specifically to protect them has the risk of making women seem vulnerable. Furthermore, researchers indicated that women-only transportation does not address the needs of LGBTI+ passengers who might be especially targeted but not welcomed onto gender-segregated vehicles [25]. These examples alone show that this measure is far from contributing to equity.

It is also crucial to consider how other groups within the society are affected from this application as intersectionality is an integral component of equitable planning decisions. The first implication for

other groups results from the fact that there is less space available for them in segregated vehicles. This might lead to longer waiting times even though the wagons reserved for women are not fully occupied. There is also an economic aspect. If women-only vehicles are the only way for women to move around safely, the network should be extended. This can be achieved in two ways. The first method is to convert part of the conventional vehicles to women-only ones. In this case, other groups will lose their access to this public transportation. The second method is to purchase new vehicles to be specifically designated to women's use. As public transportation is funded by the citizens' taxes in most cities, this would create an additional financial burden especially to low-income groups. It is known that income is a crucial factor in enabling people's access to public transportation and therefore, attempting to solve one group's problem leads to creating a larger issue.

As mentioned earlier, equity highlights each individual's right to move safely and freely as well as to have equal access. It could be seen that in the long run the women-only transportation systems are a threat to ensuring equity in public transportation. For this reason, authorities have the obligation to continue researching this topic and introduce new measures. It should be noted that an effective solution to this issue requires multi-perspective consideration.

4. Possible Effects of Autonomous Vehicles on The Gender Equity in Public Transportation

Autonomous vehicle is a futuristic technology which make their own driving decisions and minimize human interventions [37,38]. Automated cars can help to improve social and environmental mobility problems such as high levels of greenhouse gas emissions, accidents, travel time and travel costs. Therefore, public interest in autonomous vehicles has increased rapidly.

Recent literature shows that there are differences between men and women's opinions on factors such as willingness to use and pay which will determine whether or how autonomous vehicles will be adopted. Willingness to use automated cars can vary with respect to population subgroups of society. Current research on willingness to use autonomous cars indicates differences between men and women, with the latter group showing lower usage intentions [16].

Some studies [39,40] showed that men could find it easier imagining themselves using automated cars than women. In addition, Payre *et al.,* [41] indicated that men in comparison to women were more likely to use them in France.

Further differences between men and women towards automated cars were found regarding their affective reactions. The results by Kyriakidis *et al.,* [42] indicate that women tend to worry more about issues related to automated cars than men.

Recently, findings from Kyriakidis *et al.,* [42] and Bansal *et al.,* [43], which have focused on other behavioral aspects, i.e., the willingness to pay, found that men compared to women, were willing to pay more for automated cars.

When considering that men have higher conventional private car ownership along with the presented research results, the same trend could be expected to continue within autonomous vehicle ownership. This implies that it may take longer for women to adopt this new technology.

Shared autonomous vehicles are expected to reduce operation costs by eliminating the need for a driver and therefore lower public transportation costs could be expected [15]. People who cannot afford to use public transportation in the current situation might have increased accessibility as shared autonomous vehicles become more common in the network. This could be considered as a positive impact on transport equity, especially for women as they depend more on public transport.

It can be understood from the previous studies that men having more tendencies towards autonomous vehicles usage than women. Following the launch of autonomous vehicles, men are more likely to prefer using autonomous public transit or shared autonomous vehicle more than women do.

4.1 In-vehicle Security of Autonomous Vehicles

Current research on the security of AVs focuses mostly on the issue of cyber security. The vehicles have the risk of being hacked and programmed to follow a path other than the one desired by the user [44]. The issue is being addressed by scholars and developers to strengthen the software and make sure it is solid enough not get affected from virus attacks or get hacked [45-47].

Salonen's research [48] investigates the riders' opinions on the safety, security and emergency management of an autonomous shuttle bus operating in Vantaa, Finland. The bus covers a path of 950 meters and its capacity is 10 passengers. Although most of the 197 riders mention that they are satisfied with the road safety of the vehicle they note that they are concerned for their security. 64% of the respondents say that they feel less secure and 54% believe that emergency management is more difficult than a conventional bus. It is understood that the riders do not trust the vehicle's ability to solve interpersonal conflicts. Similar to conventional transportation modes, women show higher levels of concern regarding their security.

This research shows that unless precaution is taken, especially shared AVs might fail to improve women's sense of security. Within the frame of gender equity, autonomous public transits and shared autonomous vehicles should be designed with women safety measures such as GPS panic devices. There are also shared autonomous vehicle policy guidelines which could include:

not allowing the central locking system in the vehicles for the safety of women and children,

i. displaying the driver's identification and registration number in vehicle,
ii. sharing of seat should be subject to willingness of passengers.

As this is an emerging technology for which the design and policy-making processes are ongoing, there is room for improvement regarding its security. Through performing further academic research and collecting public opinion, it could be made sure that the new vehicles are a secure option for all.

This section discusses the results obtained from the surface pressure measurement study. The effects of angle of attack, Reynolds number and leading edge bluntness are discussed in the next sub section.

4. Conclusion

Women's fear of victimization in public transportation carries the risk of significantly hindering their access to jobs, education, healthcare and social services. It is understood that the current measures implemented to increase riders' sense of security have little contribution. There appears to be a gender-based difference in terms of expectations from the security applications. Women-only vehicles introduced to directly target women's issues are found to harm the sense of equity within communities as they have different consequences on different groups of people.

Autonomous vehicles stand out as a new technology and bring about the possibility of unravelling this complicated issue. Threats such as viruses and hacking could pose a new challenge with regards to cybersecurity. It is also observed that people feel more secure when accompanied by staff and have doubts about AVs ability to solve interpersonal problems [49]. Still, it is seen that if the field of research combining automated vehicles and security is enlarged, this new product might be shaped in an early phase and become a necessarily equipped, more secure transportation method.

It should be noted that women's security problems are a result of gendered power hierarchies and the solution requires an intersectional approach with a focus on equity. This study suggests short-term solutions which aim to address women's daily needs in transportation as well as long-term solutions with the goal to contribute to a more equitable future for the society.

The short-term recommendations are as follows:

i. Face recognition system: CCTV systems found inside the vehicles could be integrated with an artificial intelligence system which recognizes fear in the commuters' faces and alert the authorities for help.
ii. Increase staff on public transit: Women feel more reassured by a human existence and prefer more staff for surveillance on public transportations.
iii. Equipped with panic button on public transit: Due to being less a gendered solution, location tracking device or GPS and an alert button should be installed on all public transits.

Long-term solutions aiming towards informing individuals are as follows:

i. Cooperation with media: Bissell [50] highlights the power of media and states that individuals might be more susceptible to committing antisocial behaviour if they are exposed to fearful transmissions through media. If fictive news stories such as men being more respectful to women or people helping out an attacked woman could be transmitted, people could learn from these stories, increase their awareness and portray favourable behaviour on public transport.
ii. Visuals to increase visibility: In many cities public transit vehicles are equipped with electronic screens. These screens could be used to display informative films highlighting the significance of women's problems.
iii. People education: As Reilly *et al.,* [51] stated that there is negative correlation between education and perpetration of physical and sexual violence. Therefore, people should be educated towards women safety in public space throughout their education.

For future studies, some recommendations are given below:

i. A survey could be conducted and the model for women's safety in public transit could be estimated.
ii. New safety measures against women's victimization could be developed after examining their impacts.
iii. The psychosocial factors regarding public transportation usage can be investigated under consideration of women's security.
iv. Willingness to use private car and public transit could be analyzed with regards to gender difference.
v. Possible risk of autonomous shared car would be explored for the future implementations.

Author Contributions

Conceptualization, I.G.; methodology, I.G.; investigation, I.G. and G.G.B.; resources, I.G. and G.G.B.; writing—original draft preparation, I.G. and G.G.B.; writing—review and editing, I.G. and G.G.B.; supervision, I.G.. All authors have read and agreed to the published version of the manuscript.

Funding

This research received no external funding.

Data Availability Statement

The datasets generated during and/or analyzed during the current study is available from the corresponding author on reasonable request.

Conflicts of Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Acknowledgement

This research was not funded by any grant research.

References

[1] Masoumi, H. E., & Fastenmeier, W. (2016). Perceptions of security in public transport systems of Germany: Prospects for future research. Journal of Transportation Security, 9(1–2), 105–116. https://doi.org/10.1007/s12198-016-0169-y

[2] Beecroft, M., & Pangbourne, K. (2015). Future prospects for personal security in travel by public transport. Transportation Planning and Technology, 38(1), 131–148. https://doi.org/10.1080/03081060.2014.976980

[3] Duchène, C. (2011). Gender and transport. International Transport Forum. https://www.itf-oecd.org/sites/default/files/docs/dp201111.pdf

[4] Allen, H., & Vanderschuren, M. (2016). Safe and sound: International research on women's personal safety on public transport. FIA Foundation. https://www.fiafoundation.org/media/20if5xh4/safe-and-sound-report.pdf

[5] Dunckel-Graglia, A. (2013). Women-only transportation: How 'pink' public transportation changes public perception of women's mobility. Journal of Public Transportation, 16(2), 5. http://doi.org/10.5038/2375-0901.16.2.5

[6] Loukaitou-Sideris, A. (2014). Fear and safety in transit environments from the women's perspective. Security Journal, 27(2), 242–256. https://doi.org/10.1057/sj.2014.9

[7] Stark, J., & Meschik, M. (2018). Women's everyday mobility: Frightening situations and their impacts on travel behaviour. Transportation Research Part F: Traffic Psychology and Behaviour, 54, 311–323. https://doi.org/10.1016/j.trf.2018.02.017

[8] Mitra-Sarkar, S., & Partheeban, P. (2011). Abandon all hope, ye who enter here: Understanding the problem of 'Eve Teasing' in Chennai, India. Transportation Research Board. https://doi.org/10.17226/22887

[9] Jain, T., & Parida, P. (2014). Gender appraisal of mobility patterns and instances of exclusion for working population in Delhi. In Bridging the Gap: 5th International Conference. https://wiit-paris2014.sciencesconf.org/conference/wiit-paris2014/pages/Proceedings_The_5th_International_Conference_on_WIiT_1.pdf

[10] Easton, H., & Smith, F. (2003). Getting there: Reducing crime on public transport. Scottish Executive. https://citeseerx.ist.psu.edu/document?repid=rep1&type=pdf&doi=b07c4148d550f1279dcb9d65579898b8eaa9569b

[11] Loukaitou-Sideris, A. (2008). How safe is the ride? Evaluation of design and policy responses to women's fear of victimization and crime. UC Berkeley. https://escholarship.org/uc/item/2zg5x2sb

[12] Kash, G. (2014). Gendered perspectives on transit crime in Arequipa, Perú, and Bogotá, Colombia. Transportation Research Board. https://trid.trb.org/View/1287992

[13] Gekoski, A., Gray, J. M., Horvath, M. A. H., Edwards, S., Emirali, A., & Adler, J. R. (2015). What works in reducing sexual harassment and sexual offences on public transport nationally and internationally: A rapid evidence assessment. UK Government. https://safeguardingsupporthub.org/sites/default/files/2021-10/Gekoski%2C%20Gray%2C%20Horvath%2C%20Edwards%2C%20Emirali%20%26%20Adler%202015.pdf

[14] Litman, T. (2025). Evaluating transportation equity: Guidance for incorporating distributional impacts in transport planning. Victoria Transport Policy Institute. https://www.vtpi.org/equity.pdf

[15] Kaplan, S., Gordon, B., El Zarwi, F., Walker, J. L., & Zilberman, D. (2019). The future of autonomous vehicles: Lessons from the literature on technology adoption. Applied Economic Perspectives and Policy, 41(4), 583–597. https://doi.org/10.1093/aepp/ppz005

[16] Hohenberger, C., Spörrle, M., & Welpe, I. M. (2016). How and why do men and women differ in their willingness to use automated cars? The influence of emotions across different age groups. Transportation Research Part A: Policy and Practice, 94, 374–385. https://doi.org/10.1016/j.tra.2016.09.022

[17] Gordon, M. T., & Riger, S. (1989). The female fear. Free Press. https://books.google.com/books/about/The_Female_Fear.html?hl=tr&id=MGCapzswEv8C

[18] Reark Research. (1995). NSW Police Service community attitude survey: Executive summary interim report (February–July 1995). NSW Police.

[19] Dirección General Adjunta de Estudios. (2010). La discriminación y violencia contra las mujeres en el transporte público de la Ciudad de México. Gobierno de la Ciudad de México.

[20] Valentine, G. (1989). Images of danger: Women's sources of information about the spatial distribution of male violence. Area, 21(4), 385–390. https://www.jstor.org/stable/20003048
[21] Wade, L. (2009). The relativity of feminist liberation. Sociological Images. https://thesocietypages.org/socimages/2009/12/08/the-relativity-of-feminist-liberation/
[22] Loukaitou-Sideris, A. (2015). Intimidated riders: US women's perspectives about safety in transit settings. In Safety and security in transit environments (pp. 291–308). Palgrave Macmillan. https://doi.org/10.1057/9781137457653_16
[23] Smith, M. J. (2008). Addressing the security needs of women passengers on public transport. Security Journal, 21(2), 117–133. https://www.ojp.gov/ncjrs/virtual-library/abstracts/addressing-security-needs-women-passengers-public-transport
[24] UN Women Asia and the Pacific. (2012). Making Port Moresby safer for women and girls: A scoping study. https://asiapacific.unwomen.org/en/digital-library/publications/2012/9/making-port-moresby-safer-for-women-and-girls
[25] Note: No DOI; linked to UN Women.
[26] Kash, G. (2014). Crime in informal and formal public transit systems: A comparison of user perceptions in El Alto, Bolivia and Bogotá and Soacha, Colombia. http://www.triointerativa.com.br/hermes/wpsc_insc/upload/d_9242775808088.doc
[27] Loukaitou-Sideris, A., & Fink, C. (2009). Addressing women's fear of victimization in transportation settings. Urban Affairs Review, 44(4), 554–587. https://doi.org/10.1177/1078087408322874
[28] Beyazit, E. (2011). Evaluating social justice in transport: Lessons to be learned from the capability approach. Transport Reviews, 31(1), 117–134. https://doi.org/10.1080/01441647.2010.504900
[29] Kramer, A., & Goldstein, A. (2015). Meeting the public's need for transit options: Characteristics of socially equitable transit networks. https://www.proquest.com/docview/1714094266
[30] Lubitow, A., Rainer, J., & Bassett, S. (2017). Exclusion and vulnerability on public transit: Experiences of transit-dependent riders in Portland, Oregon. Mobilities, 12(6), 924–937. https://doi.org/10.1080/17450101.2016.1253816
[31] Lee, R. J., Sener, I. N., & Jones, S. N. (2017). Understanding the role of equity in active transportation planning in the United States. Transport Reviews, 37(2), 211–226. https://doi.org/10.1080/01441647.2016.1239660
[32] Lecompte, M. C., & Pablo, B. S. J. (2017). Transport systems and their impact on gender equity. Transportation Research Procedia, 25, 4245–4257. https://doi.org/10.1016/j.trpro.2017.05.230
[33] Norman, K. (2013). Social dimensions of transport: A resource for social impact appraisals. DFID. https://www.research4cap.org/wp-content/uploads/ral/Norman-DFID-Africa-2013-Social+Dimensions+Transport-DFID-v130805.pdf
[34] Pakusch, C., & Bossauer, P. (2017). User acceptance of fully autonomous public transport. Proceedings of the 9th International Conference on Agents and Artificial Intelligence, 52–60. https://doi.org/10.5220/0006472900520060
[35] Swedish International Development Cooperation Agency. (2005). Guidelines for gender mainstreaming. SIDA.
[36] Allen, H. (2016). Safe and secure, from London to Lahore and everywhere in between! LinkedIn. https://www.linkedin.com/pulse/safe-secure-from-london-lahore-everywhere-between-heather-allen/
[37] Tillous, M., & Gillot, G. (2014). Women-only cars in the Cairo metro: A response to what problem? Mouvements, 78(2), 102–112. https://doi.org/10.34894/VQ1DJA
[38] Walker, G. H., Stanton, N. A., & Young, M. S. (2001). Where is computing driving cars? *International Journal of Human-Computer Interaction, 13*(2), 203–229. https://doi.org/10.1207/S15327590IJHC1302_7
[39] Özgüner, Ü., Stiller, C., & Redmill, K. (2007). Systems for safety and autonomous behavior in cars: The DARPA grand challenge experience. Proceedings of the IEEE, 95(2), 397–412. https://doi.org/10.1109/JPROC.2006.888394
[40] EY. (2013). Autonomes Fahren – die Zukunft des Pkw-Marktes? EYGM Limited.
[41] Schoettle, B., & Sivak, M. (2014). A survey of public opinion about autonomous and self-driving vehicles in the U.S., the U.K., and Australia. University of Michigan. https://deepblue.lib.umich.edu/bitstream/handle/2027.42/108384/103024.pdf
[42] Payre, W., Cestac, J., & Delhomme, P. (2014). Intention to use a fully automated car: Attitudes and a priori acceptability. Transportation Research Part F: Traffic Psychology and Behaviour, 27, 252–263. https://doi.org/10.1016/j.trf.2014.04.009
[43] Kyriakidis, M., Happee, R., & De Winter, J. C. F. (2015). Public opinion on automated driving: Results of an international questionnaire among 5000 respondents. Transportation Research Part F: Traffic Psychology and Behaviour, 32, 127–140. https://doi.org/10.1016/j.trf.2015.04.014
[44] Bansal, P., Kockelman, K. M., & Singh, A. (2016). Assessing public opinions of and interest in new vehicle technologies: An Austin perspective. Transportation Research Part C: Emerging Technologies, 67, 1–14. https://doi.org/10.1016/j.trc.2016.01.019

[45] Hulse, L. M., Xie, H., & Galea, E. R. (2018). Perceptions of autonomous vehicles: Relationships with road users, risk, gender and age. Safety Science, 102, 1–13. https://doi.org/10.1016/j.ssci.2017.10.001
[46] Bagloee, S. A., Tavana, M., Asadi, M., & Oliver, T. (2016). Autonomous vehicles: Challenges, opportunities, and future implications for transportation policies. Journal of Modern Transportation, 24(4), 284–303. https://doi.org/10.1007/s40534-016-0117-3
[47] König, M., & Neumayr, L. (2017). Users' resistance towards radical innovations: The case of the self-driving car. Transportation Research Part F: Traffic Psychology and Behaviour, 44, 42–52. https://doi.org/10.1016/j.trf.2016.10.013
[48] De La Torre, G., Rad, P., & Choo, K. K. R. (2020). Driverless vehicle security: Challenges and future research opportunities. Future Generation Computer Systems, 108, 1092–1111. https://doi.org/10.1016/j.future.2017.12.041
[49] Salonen, A. O. (2018). Passenger's subjective traffic safety, in-vehicle security and emergency management in the driverless shuttle bus in Finland. Transport Policy, 61, 106–110. https://doi.org/10.1016/j.tranpol.2017.10.011
[50] Bissell, D. (2010). Passenger mobilities: Affective atmospheres and the sociality of public transport. Environment and Planning D: Society and Space, 28(2), 270–289. https://doi.org/10.1068/d3909
[51] Reilly, M. E., Lott, B., Caldwell, D., & DeLuca, L. (1992). Tolerance for sexual harassment related to self-reported sexual victimization. Gender & Society, 6(1), 122–138. https://doi.org/10.1177/089124392006001008