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Volume: 5

Issue: 4

Month: October

Year: 2026

ISSN: 2583-7117

Published: 21.10.2026

Citation:

Ashish Kumar Das, Sipra Mohapatra, Osin Sanghamitra Patel, Sanghamitra Mohapatra, "Sustainable Urban Mobility and Pedestrian Safety: A Review of Foot Overbridges, Road Crossing Behaviour, and Safety Interventions" International Journal of Innovations in Science Engineering and Management, vol. 5, no. 4, 2026, pp. 197-205.

DOI:

10.69968/ijisem.2026v5i4197-205



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Sustainable Urban Mobility and Pedestrian Safety: A Review of Foot Overbridges, Road Crossing Behaviour, and Safety Interventions

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Abstract

Safe, accessible and convenient pedestrian facilities are essential for sustainable urban mobility to promote walking and mitigate road traffic risks. The crosswalk behavior and the foot overbridges (FOB) relationship and the effectiveness of safety intervention in sustainable urban transport planning is reviewed. It discusses human and behavioural factors, infrastructure conditions, and traffic dynamics influencing pedestrian crossing decisions. In addition to engineering, behavioural, enforcement, and integrated safety interventions, the review assesses FOB accessibility, location, connectivity, and user-convenience. Effectiveness of pedestrian facilities is strongly affected by pedestrian preferences, road conditions, and accessibility requirements, in addition to the provision of pedestrian facilities. Pedestrian-oriented planning, inclusive design, appropriate speed control and context-specific interventions are all critical to improving safety. Enhancing the collection and long-term assessment of crashes can also contribute to evidence-based policies for safer and more sustainable urban mobility, especially in Indian cities and other developing urban settings.

Keywords: Sustainable Urban Mobility, Pedestrian Safety, Foot Overbridges, Crossing Behaviour, Safety Interventions

INTRODUCTION

Sustainable urban mobility is a multifaceted field of transportation development that treats mobility needs of the urban population in general terms, while ensuring accessibility, safety and environmental sustainability. Walking is fundamental to sustainable transport as it generates no direct emissions, is increasingly used for physical activity, and enables access to public transport, jobs, education and services. The role of walking in sustainable mobility, however, relies on the presence of safe pedestrian facilities and their incorporation into the urban transport planning process [1]. Road traffic injuries continue to pose a serious threat to pedestrians because they lack the physical protection from moving vehicles that is afforded to other road users. High speeds, greater numbers of vehicles, lack of foot paths, unsafe crossing locations, and a lack of crossing facilities all exacerbate pedestrian risks. In rapidly urbanising regions, these pressures have special impact, as in some places transport facilities are designed for the convenience of vehicles rather than safety and comfort of pedestrians. Improving pedestrian safety is therefore a vital aspect to be considered in the context of reducing road traffic injuries, facilitating inclusive mobility and promoting walking as a viable means of urban transport [2], [3].

Pedestrian safety planning needs to account for the provision of infrastructure as well as the behaviour of road users. The main purpose of foot overbridges (FOBs) is to try to keep pedestrians away from the road so that there are fewer direct conflicts between pedestrians and vehicles. However, they need to be located at appropriate sites, accessible, have an extra walking distance, be easy to use and be perceived as convenient [4], [5]. All these can affect the decision of whether or not pedestrians may cross a road at ground level or take an overbridge.

Likewise, when implemented correctly, at-grade crossings, pedestrian signals, traffic-calming devices, better footpaths and speed management can lead to safer road environments [6], [7]. The analysis of pedestrian crossing behaviour along with the design and use of FOB is, therefore, crucial to understanding why pupils cross roads unsafely and what steps are appropriate to take to ensure their safety. Pedestrian safety can be improved, and accessibility and urban transport sustainability improved, with a combination of pedestrian-friendly infrastructure, good traffic control, behaviour awareness and inclusive planning [8]. This review focuses on pedestrian crossing behaviour, the function of foot overbridges and effectiveness of safety interventions to facilitate safer and more sustainable urban mobility.



Figure 1: Pedestrian Crossing

Pedestrian Crossing Behaviour and Factors Influencing Road Safety

Pedestrian crossing behaviour is defined as the decision-making process and actions people take when crossing roads, including crossing patterns, walking speed, whether they are using a designated crossing and risk-taking across varying traffic conditions. These behaviours are influenced by their own personality and characteristics, their perceptions of safety, the design of the roadway and adjacent traffic. Recognition of such variations is significant because pedestrian safety is not purely infrastructure-based, it is dependent on human decision making and infrastructure [9], [10].

Core Factors Influencing Road Safety:

1. **Human and Behavioural Factors:** Pedestrian ability to detect hazards and choose safe crossings is affected by human and behavioural factors. Mobile phones, chatter or other activities can distract attention from approaching vehicles and traffic signals. Impatience and urgency can cause

pedestrians to step out between cars or take smaller traffic gaps than they would wait for otherwise. Pedestrian alertness, judgement and ability to cross rapidly can be compromised by fatigue and physical impairment, and person-to-person variations in risk perception will affect the way pedestrians assess traffic hazards. These may help lead to unsafe crossing choices, especially when pedestrians underestimate the speed of the vehicle or overestimate their crossing capabilities [11].

2. **Infrastructure and Environmental Factors:**

Decision to cross, and visibility of pedestrians on road is highly dependent on road infrastructure and environment. Broadening the road likely increases the time it takes to cross and the need to coordinate with traffic, which can lead to increased exposure to moving vehicles. When crossing facilities are located away from destinations for pedestrians, they can promote informal crossing which might be more convenient. Restricted vision due to parked vehicles, obstructions to the road, lack of signage or lack of lighting may fail to alert pedestrians and drivers to potential conflicts in time. In contrast, clearly identified crossings, appropriate pedestrian signals, sufficient lighting, and accessible footpaths can enhance the crossing convenience and facilitate safer pedestrian crossing [12].

3. **Traffic and Vehicular Dynamics:** Pedestrian crossing safety is largely dependent on the speed of vehicles and traffic volumes. Speed makes it harder to assess safe crossing opportunities, and can increase the risk of serious injury; heavy traffic can cause fewer crossing opportunities, and may make waiting times longer. In Indian cities, where mixed traffic is common, the dynamics of the vehicles and other road users become more complex, involving cars, motorcycles, buses, auto-rickshaws, and other modes of transport all operating at varying speeds. There may be additional confusion in pedestrian decisions if vehicles move erratically and do not consistently respect the crossing traffic. Hence, the safety of pedestrians must be considered in the context of coordinated human behaviour, infrastructure design and traffic conditions [13].

Table 1: Pedestrian Crossing Behaviour and Factors Influencing Road Safety

Key factor	Influencing elements	Impact on pedestrian safety
Pedestrian crossing behaviour	Crossing patterns, walking speed, compliance, risk-taking, demographic differences	Determines crossing decisions and exposure to traffic risks
Human and behavioural factors	Distraction, urgency, impatience, fatigue, impairment, risk perception	Increases unsafe crossing decisions and hazard misjudgement
Infrastructure and environmental factors	Road width, crossing placement, visibility, signage, lighting	Affects crossing convenience, visibility, and pedestrian protection
Traffic and vehicular dynamics	Vehicle speed, traffic volume, mixed traffic conditions	Influences available crossing gaps and collision severity

Foot Overbridges in Sustainable Urban Mobility

Foot overbridges (FOBs) are grade separated pedestrian crossing structures that enable pedestrians to cross above road traffic, without making direct contact with road traffic. They are generally located on high-traffic city streets to minimize pedestrian-vehicle interactions and ensure uninterrupted traffic. The potential role of their contribution towards sustainable urban mobility is dependent on whether they offer safe, convenient and accessible links from pedestrian destinations. Studies have shown that people may choose to cross at-grade rather than by a FOB if it is a longer

time or longer distance to cross by FOB. Thus, the provision of an overbridge does not automatically mean that it is effectively used and enhances pedestrian access [14].

One of the key aspects of FOB design is accessibility. Older adults, persons with disabilities, persons carrying luggage, and pedestrians with children, may find stair climbing physically demanding. The distance to be traversed and crossing times may further deter use, especially if a convenient ground level crossing is available. The proper placement of ramps with appropriate gradients and lifts, handrails, tactile paving, and lighting can increase the accessibility and usability of ramps for all types of users. These facilities must be appropriately designed and maintained and operated reliably, however, for them to be effective [15].

Effectiveness of FOB placement and connectivity is also equally important. The position of overbridges should be as close as possible to pedestrian desire lines, public transport stops, commercial areas, educational institutions, and other significant destinations. Access points, footpaths, signage, and approaches that are convenient, continuous, clear, and unobstructed can minimize detours and increase use. The choice of crossing infrastructure should be based on the following: traffic demand, pedestrian demand, road geometry, accessibility demand, and availability of safe at-grade options. These considerations should be incorporated into urban transport planning to maintain the functionality of FOBs for pedestrian safety while retaining the convenience, inclusiveness and sustainable mobility they provide.



Figure 2: Foot Overbridges

Table 2: Foot Overbridges in Sustainable Urban Mobility

Key aspect	Important considerations	Implications for sustainable mobility
Grade separation	Separation of pedestrians from vehicular traffic	Reduces pedestrian–vehicle conflicts
Accessibility	Stairs, ramps, lifts, handrails, tactile paving	Supports older adults and people with disabilities
User convenience	Additional walking distance and crossing time	Influences FOB utilization
Location and connectivity	Proximity to pedestrian routes, public transport, and destinations	Encourages convenient and safer crossing
Design and maintenance	Lighting, signage, unobstructed access, lift reliability	Improves usability and pedestrian safety

Pedestrian Safety Interventions

Pedestrian safety interventions are those activities that are implemented to mitigate pedestrian–vehicle conflict, prevent road traffic injuries, and promote safe walking conditions. The interventions focus on risks stemming from the design of the road, movement of vehicles, pedestrian behaviour, and enforcement of traffic rules. The selection of measures depends on the road conditions, the amount of pedestrians, the speed of traffic and the vulnerable road user profile. Combined engineering, behavioral, and coordinated safety measures can help to create safer and more convenient city mobility [16], [17].

1. **Engineering Interventions:** Engineering interventions are directed toward enhancing roadway facilities and minimizing exposure of pedestrians to moving vehicles. These include at-grade pedestrian crossings and signalised crosswalks, which identify crossing points, and raised crossings, which can slow traffic and enhance pedestrian visibility. There are refuge islands to cross wider roads in stages, and continuous sidewalks for pedestrians to have a safer place to walk away from traffic. Better lighting makes it easier to spot pedestrians, especially at night, and traffic calming measures such as the installation of speed humps or narrowing the road can help reduce the speed of vehicles. These measures are effective if they are placed, visible, maintained and coordinated with other pedestrian routes.

2. **Behavioural and Enforcement Interventions:**

The goals of behaviour and enforcement interventions are to promote responsible road use by pedestrians and drivers. Pedestrian safety awareness programmes can raise awareness about safe crossing practices, traffic signals and hazards on the road; driver education can encourage yielding to pedestrians and increased awareness of vulnerable road users. Safety behaviour could be discouraged with speed limiters and monitoring compliance of traffic signals and penalties for unsafe driving. But, awareness campaigns may not be enough if road infrastructure is unsafe, or crossing facilities are inconvenient. Behavioural measures thus become more useful if they have the right infrastructure and are well enforced.

3. **Integrated Interventions:** Integrating interventions means bringing together road engineering, speed management, law enforcement and public education to help solve the problem of pedestrian safety from a variety of angles. For instance, a school zone can include raised crossings, lowered speed limits, upgraded lighting, warning signs and awareness programs for students and drivers. Also, high flow urban crossings could benefit from signalised crossing, refuge islands, visible road markings and penalisation for signal violation. These interventions can tackle problematic roads and bad driver behaviour at the same time. Coordinated interventions have shown promise in enhancing pedestrian safety but effectiveness varies by area, intervention implementation quality, and continued monitoring.

Integrating Pedestrian Safety into Sustainable Urban Transport Planning

To embed pedestrian safety into sustainable urban transport planning, it is essential to undertake a coordinated approach with a holistic view towards safe, accessible and convenient walking and other modes. The design of pedestrian facilities should be viewed not as a standalone facility, but as a component of a broader transport system that connects communities, schools, workforce, commercial centres, and public transport [18]. Safer road infrastructure and speed management are key to reducing pedestrian injuries, according to the World Health Organization. Thus, it is essential to integrate suitable crossing infrastructure, street design that is inviting and accessible, context-specific solutions and evidence-based policies for increasing the

safety for pedestrians and ensuring sustainable and equitable urban mobility [19].

1. **Pedestrian-Oriented Planning:** Pedestrian oriented planning aims to develop a continuous and linked pedestrian network by providing safe crossings, accessible footpaths and a good connection to public transport hubs. Crossing facilities should be located close to pedestrian destinations, and should be connected to sidewalks to reduce unnecessary detours. Safety and convenience can be further enhanced through adequate lighting, signage and adequate walking surfaces. Combining walking with public transport also helps to promote walking at bus stops and railway stations, which makes them safer and more convenient.
2. **Inclusive Infrastructure:** Pedestrian crossing facilities are designed to accommodate the needs of walkers of varying age and physical abilities with inclusive infrastructure. Steps, longer walking distances or inaccessible approaches can make it difficult for children, older adults, and persons with disabilities to use FOBs. Making it usable with ramps, functional lifts, tactile paving and accessible at-grade crossing may help. The choice between FOBs and ground-level crossings should consider pedestrian needs, road speed, traffic volume, and the availability of accessible alternatives.
3. **Context-Specific Intervention Selection:** Pedestrian safety interventions should reflect local road and land-use conditions rather than follow a uniform design approach. Traffic speed, road width, pedestrian demand, nearby destinations, mixed traffic, and existing crossing behaviour influence the suitability of different facilities. For example, raised crossings and traffic-calming measures may be appropriate in lower-speed areas, whereas busy arterial roads may require carefully designed signalised crossings or grade-separated facilities with accessible connections. Local assessment helps ensure that interventions address actual risks and remain convenient for pedestrians.
4. **Research and Policy Priorities:** Improving pedestrian safety requires reliable crash records, pedestrian surveys, and long-term evaluations of infrastructure and policy interventions. Greater attention should be given to Indian cities and other

low- and middle-income settings, where heterogeneous traffic, infrastructure limitations, and inconsistent enforcement create distinctive challenges. Linking crash data with information on pedestrian volumes, crossing behaviour, road design, and accessibility can help identify high-risk locations and assess intervention effectiveness. Such evidence can support locally appropriate policies and more effective allocation of urban transport resources.

LITERATURE REVIEW

Anastasiadou & Kehagia, (2025)[20] In order to design successful policies, the current study aims to give decision support analysts and policymakers a decision-support tool that detects and prioritises the factors weakening road safety in an urban region. Based on a worldwide literature analysis, a thorough inventory of factors that might compromise road safety in an urban region is supplied, together with an inventory of pertinent regulations and initiatives. The most critical factors and, consequently, the most effective policies and measures are identified and prioritised using "a multi-criteria approach (modified Delphi–analytical hierarchy process (AHP)–technique for order preference by similarity to ideal solution (TOPSIS))". The Greek urban road networks are chosen as a case study, beginning with Thessaloniki, the country's second-largest city. Four sets of measures and policies are identified and prioritised based on the most significant factors, which include problems with limited resources that prevent systematic surveillance and policing, making arbitrary decisions instead of adopting a scientific decision-aiding methodology, issues with education and mentality, infrastructure planning and maintenance, cooperation and coordination between different authorities, and laxity of penalties.

Mukherjee, (2025) [13] In an Indian mid-sized metropolis, the current study suggests and illustrates a unique method for proactively assessing pedestrian safety across various land use patterns. By using the Post-encroachment Time (PET) approach to analyse pedestrian-vehicle conflicts and evaluate pedestrians' perceived danger, the study offers thorough insights into the safety dynamics. This study used video recordings and on-site questionnaire surveys at twelve signalised crossings in Patiala City, Punjab, India, to comprehensively analyse 8,205 pedestrian-vehicle interactions and the risk perceptions of 2,495 pedestrians. According to the study's findings, religious places have a perceived danger that is 9.5% greater and an average PET that is much lower (0.897 s) than educational

centers (2.443 s). During nighttime peak hours (7:00–8:00 pm), the probability of crucial pedestrian-vehicle contacts increases by 30%, and the probability of conflicts is increased by 39.5% when pedestrians roll. Pedestrians who have had crashes in the past report a 4.35% increased perceived danger. Additionally, older pedestrians (those over 50) perceive a significantly higher level of risk—roughly 11% higher than younger pedestrians.

Nejad et al., (2025) [21] Using the Health Belief Model (HBM) as a framework, this study sought to determine the factors impacting pedestrians' road traffic safety preventative behaviours among Shahid Beheshti University of Medical Sciences (SBMU) students. A multi-stage sampling technique was used in 2022 to choose 337 SBMU students. A 45-item questionnaire based on HBM constructs—perceived susceptibility, perceived severity, perceived advantages, perceived obstacles, signals to action, and behavior—was used to gather data. SBMU's social media platforms were used to electronically disseminate the questionnaire. SPSS software (version 18) was used to analyse the data. Statistical significance was defined as $P < 0.05$. Social media and family have a significant influence on how pupils see traffic safety. Students' preventative behaviours can be greatly encouraged by improving perceived susceptibility and advantages as well as by offering useful cues to action.

Seferoğlu & Allahverdiyev, (2025) [22] reviewed the literature on strategies for enhancing pedestrian comfort and safety in metropolitan areas. In order to reduce traffic incidents and encourage sustainable movements, key measures including sidewalk enlargement, pedestrian-only areas with restricted access, and integrated green spaces were investigated at the design level. There is a dearth of research on pedestrian/cycle-centric planning, especially when it comes to identifying socioeconomic impacts. This study aims to give policymakers and urban planners practical ideas to support inclusive, safe, and walkable communities by synthesising recent research. The results provide implications for future study and deepen our understanding of how pedestrian-focused designs increase public health, safety, and environmental sustainability.

Osuret et al., (2024) [23] investigate the associated factors and crossing behaviour of child pedestrians in the vicinity of primary schools in Kampala, Uganda. In 2022, we carried out a cross-sectional research with 2100 elementary school students. Video recordings from cameras positioned at the crossing sites of 21 schools were used to collect information on their crossing behaviour. For the

relationship between dangerous behaviour and the variables, we generated prevalence ratios (PR) with their related 95% CIs using a modified Poisson regression model. These results show how pedestrians, cars, and the surrounding area interact during crossings. The existence of an obstruction, crossing alone, and the lack of a traffic warden were among factors linked to risky kid pedestrian behaviour. The need to emphasise specific safety measures is highlighted by these results, which can aid academics and practitioners in understanding kid pedestrian crossing behaviour.

Babu et al., (2023) [24] Due to traffic congestion and population growth, pedestrian mobility in urban areas is becoming more difficult. Foot Over Bridges, often called pedestrian bridges, are essential for enabling pedestrians to cross congested roadways or crossroads safely and effectively. However, the effectiveness of conventional FOBs depends on a number of factors, including design, accessibility, and surrounding infrastructure. Additionally, using escalators and lifts to make foot over bridges more accessible results in the use of conventional energy, which raises operational costs and environmental concerns. In this regard, incorporating solar energy into a foot-over bridge with automatic escalators offers a viable way to deal with these issues. The suggested system explores the idea of using solar energy to power automated escalators with foot-over bridges as a sustainable urban pedestrian mobility option.

Banerjee & Maurya, (2020) [25] examines how pedestrians navigate over bridges in four distinct Indian cities with the same land use type (commercial sector). Using a videography approach, the data was gathered on weekdays at commercial places in the cities of Kolkata, Bengaluru, Guwahati, and New Delhi. The mean and median speeds of pedestrians were predicted using box plots and radar charts according to baggage, age, and gender. To comprehend the differences in pace across the various kinds of pedestrians, probability density functions were also employed. The land use type of the pedestrian amenities was predicted to contribute to the 5–6 m/min faster walking speeds of the pedestrians carrying bags at all four sites. Additionally, for every area, pedestrians between the ages of 23 and 45 had the fastest walking speeds when compared to the other age groups. In contrast to the other sites, site 3 was determined to have the greatest measured maximum flow rate and density.

Job, (2020) [26] Pedestrians are more negatively impacted by automobile mobility than other road users. Roads are neither safe nor becoming better for pedestrians: Between 2013 and 2016, there was a 12.9% rise in

pedestrian deaths worldwide, which is over double the rate of other road collision deaths (6.6% increase for other road users). In many places, pedestrians lack pathways, safe crossings, and acceptable speeds. This essay summarises pedestrian safety triumphs and failures, examines the shortcomings and restrictions of pedestrian safety initiatives, and pinpoints obstacles to successful action. Road usage culture, victim blaming, underestimating the number of pedestrian collision deaths in particular, and other crash data difficulties are obstacles. To remove these obstacles and increase pedestrian safety, advocacy, laws, and other measures are advised.

DISCUSSION

The literature reviewed shows that the safety of pedestrians is a result of the interaction between human behavior, infrastructure design and traffic dynamics. Pedestrian decisions may be influenced by distraction, lack of patience, perception of risk, and crossing convenience; vehicle speed, level of lighting, and crossing location can increase exposure to traffic hazards. There are also differences in pedestrian flow and perceived risk as per age, land-use, and traffic conditions that can be seen in Indian urban areas. Foot overbridges are used to physically isolate pedestrians from traffic, however, their success relies on accessibility, placement, and usability. Insufficient access, lack of steps and walkable routes can discourage use, especially older adults and those with disabilities. The use of engineering measures, awareness-raising among the population and traffic enforcement are thus not mutually exclusive but complementary means. Combining safe at-grade crossings, extended footpaths, traffic calming measures and accessible grade separated facilities can help facilitate more inclusive mobility. Local variation in roadway characteristics and pedestrian demand, however, underscores the need for a site-specific approach, accurate crash data and the need to monitor and assess the effectiveness of interventions over time.

CONCLUSION

Pedestrian safety is an essential element of Sustainable Urban Mobility, as safer walking conditions increase accessibility, inclusiveness and the attractiveness of non-motorised transport. This review underscores the need for a holistic understanding of pedestrian crossing behavior, working alongside infrastructure design, traffic operations, and safety interventions. Direct pedestrian-vehicle conflicts can be reduced by foot overbridges, but only if they are placed and accessible correctly, are connected to the pedestrian network, and provide convenience for users.

Public awareness, driver education and effective enforcement should be supported by engineering improvements such as signalised crossings and refuge islands, continuous footpaths, lighting and traffic calming. Urban transport planning should consider the needs of children, older adults and people with disability and take into account local traffic conditions and pedestrian demand. Continuing studies are needed to enhance pedestrian crash databases, analyze pedestrian crossing behavior in a variety of urban contexts, and assess pedestrian crossing interventions over longer time durations. A coherent, evidence-based, and pedestrian-centric strategy can play a role in making streets safer and in creating inclusive, environmentally sustainable urban transportation systems.

REFERENCES

- [1] Anil Maan, "Urban Transportation Sustainability In India: A State-And City-Level Application Of The UNESCAP Sustainable Urban Transport Index With Cross-National Benchmarking," *J. Asia Entrep. Sustain.*, vol. 22, no. 3s, pp. 204–222, 2026, doi: 10.66635/dg0mx266.
- [2] K. A. Naseem, A. Khan, J. A. Codjoe, and W. A. Khan, "Enhancing Pedestrian Safety through Infrastructure, Behavioral, and Technological Interventions: A Structured Review of Urban Transportation Safety Measures," *Smart Urban Syst. Infrastruct.*, vol. 2, no. 1, pp. 1–17, 2026.
- [3] S. Moslem *et al.*, "Evaluating pedestrian behavior factors related to road safety using analytic hierarchy process and Kendall's correlation in a fuzzy environment," *Transp. Res. Interdiscip. Perspect.*, vol. 36, pp. 1–9, 2026, doi: 10.1016/j.trip.2026.101850.
- [4] B. Akki and R. Kvr, "Pedestrian Safety: Understanding the Interplay of Awareness, Attitudes, and Violation Behaviour," *J. Road Saf.*, vol. 37, no. 2, pp. 64–74, 2026, doi: 10.33492/JRS-D-26-2-2732313.
- [5] S. Dehariya and D. Sharma, "Study On Highway Roadside Safety Prabhat Chauraha to Bajrang Chauraha Raisen Road Bhopal," *Int. J. Innov. Sci. Eng. Manag.*, vol. 3, no. 3, pp. 44–50, 2024.
- [6] S. Prakash and K. Karuppanagounder, "Parametric Study on the Influence of Pedestrians' Road Crossing Pattern on Safety," *Open Transp. J.*, vol.

- 17, pp. 1–11, 2023, doi: 10.2174/18744478-v17-e230120-2022-8.
 - [7] S. ÇINAR, Ş. YILMAZ, and B. ÖZ, “Pedestrians’ Crossing Behaviors and Crossing Preferences: A Field Study,” *Trans. Transp. Sci.*, vol. 2, pp. 18–26, 2022.
 - [8] L. Kumar, “Pedestrian Safety on Indian Roads- A critical review,” *Int. J. Tech. Innov. Mod. Eng. Sci.*, vol. 4, no. 6, pp. 51–55, 2018.
 - [9] D. Mukherjee and A. Kumar, “Identification of Factors Influencing Pedestrian Perceived Safety and Satisfaction Level Using Ordered Logit Models in an Indian Midsized City,” *Int. J. Transp. Dev. Integr.*, vol. 8, no. 2, pp. 283–299, 2024, doi: 10.18280/ijttdi.080207.
 - [10] D. Mukherjee and S. Mitra, “Proactive pedestrian safety evaluation at urban road network level, an experience in Kolkata City, India,” *Int. J. Inj. Contr. Saf. Promot.*, vol. 29, no. 2, pp. 160–181, May 2022, doi: 10.1080/17457300.2021.1973509.
 - [11] N. C. Vijay, S. Rokade, and G. R. Bivina, “Towards safer streets: A review of child pedestrian behavior and safety worldwide,” *Transp. Res. Part F Traffic Psychol. Behav.*, vol. 103, pp. 638–660, 2024, doi: <https://doi.org/10.1016/j.trf.2024.05.005>.
 - [12] D. Vaidya, P. Ugemuge, G. Wakpaijan, S. Tiple, and N. Bhadke, “Analysis and Design of Foot Over Bridge,” *Int. J. Res. Appl. Sci. Eng. Technol.*, vol. 11, pp. 4490–4495, Apr. 2023, doi: 10.22214/ijraset.2023.51311.
 - [13] D. Mukherjee, “Assessing pedestrian safety at urban signalized intersections across various land use types: insights from a mid-sized Indian city,” *Discov. Appl. Sci.*, vol. 7, no. 384, 2025, doi: 10.1007/s42452-025-06945-y.
 - [14] A. Paul and S. Qamar, “Assessment of Utilization of the Foot Over Bridges in Delhi,” in *Urban Mobility Research in India*, 2023, pp. 283–308. doi: 10.1007/978-981-99-3447-8_14.
 - [15] S. Bhoyar, D. B. V. Khode, J. Bhoyar, and R. Upadhyay, “A Proposal of Foot Over Bridge at Congested Intersection,” *Int. J. Sci. Res. Sci. Technol.*, vol. 8, no. 3, pp. 406–413, 2021, doi: 10.32628/ijrst218384.
 - [16] D. Patel, “Evaluating the Effectiveness of Pedestrian Safety Intervention Program: Behavioral and Observationall Approach,” 2020. [Online]. Available: <https://doi.org/10.1016/j.jnc.2020.125798%0Ahttps://doi.org/10.1016/j.smr.2020.02.002%0Ahttp://www.ncbi.nlm.nih.gov/pubmed/810049%0Ahttp://doi.wiley.com/10.1002/anie.197505391%0Ahttp://www.sciencedirect.com/science/article/pii/B9780857090409500205%0Ahttp://>
 - [17] R. Khabiri, L. Jahangiry, H. R. Birgani, and H. Sadeghi-bazargani, “Interventions for Increasing Pedestrian Visibility to Prevent Injury and Death: A Systematic Review,” *Heal. Soc. Care Community*, p. 13, 2025, doi: 10.1155/hsc/2958743.
 - [18] S. Rakshith, A. M. R, and V. Anjaneyappa, “Analysis of pedestrian walkability index in urban footpaths,” *Urban, Plan. Transp. Res.*, vol. 13, no. 1, pp. 1–15, 2025, doi: 10.1080/21650020.2025.2557254.
 - [19] S. N. Sharma and K. Dehalwar, “A Systematic Literature Review of Pedestrian Safety in Urban Transport Systems,” *J. Road Saf.*, vol. 36, no. 4, pp. 41–64, 2025, doi: 10.33492/JRS-D-25-4-2707507.
 - [20] K. Anastasiadou and F. Kehagia, “Road Safety Improvement and Sustainable Urban Mobility: Identification and Prioritization of Factors and Policies Through a Multi-Criteria Approach,” *Urban Sci.*, vol. 9, no. 93, pp. 1–33, 2025, doi: 10.3390/urbansci9040093.
 - [21] M. S. Nejad, F. Estebarsari, M. Abbasi, and M. Latifi, “Influencing Factors on Students’ Pedestrian Safety Behavior: A Descriptive Analytical Study,” *Bull. Emerg. Trauma*, vol. 13, no. 2, pp. 98–104, 2025, doi: 10.30476/beat.2025.105958.1578.Copyright.
 - [22] M. T. Seferoğlu and J. Allahverdiyev, “Pedestrian Safety and Sustainable Urban Planning: A Literature Review on Walkable City Design,” *Proc. Int. Conf. Contemp. Aff. Archit. Urban.*, vol. 8, pp. 1639–1642, 2025, doi: 10.38027/iccaua2025tr0038.
 - [23] J. Osuret, A. Van Niekerk, O. Kobusingye, L. Atuyambe, and V. Nankabirwa, “Child pedestrian crossing behaviour and associated risk factors in

- school zones: A video-based observational study in Kampala, Uganda,” *Inj. Prev.*, vol. 30, no. 3, pp. 216–223, 2024, doi: 10.1136/ip-2023-044932.
- [24] D. P. R. Babu, S. Vignesh, M. Badri, and G. S. Preetham, “Solar Powered Foot Over Bridge – A Sustainable Solution for Urban Pedestrian Mobility,” *Int. J. Eng. Res. Electr. Electron. Eng.*, vol. 10, no. 6, pp. 1–4, 2023.
- [25] A. Banerjee and A. K. Maurya, “A comparative study of pedestrian movement behavior over foot over bridges under similar land-use type,” *Transp. Res. Procedia*, vol. 48, pp. 3342–3354, 2020, doi: 10.1016/j.trpro.2020.08.119.
- [26] R. F. S. Job, “Policies and Interventions to Provide Safety for Pedestrians and Overcome the Systematic Biases Underlying the Failures,” *Front. Sustain. Cities*, vol. 2, no. 30, pp. 1–8, 2020, doi: 10.3389/frsc.2020.00030.