



## From Khost (Afghanistan) to Tehran (Iran): The Role of Environmental Perception and Sense of Place in Pedestrian Risk Perception

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### Introduction

Pedestrians account for 23% of global road traffic deaths, with over half occurring in low-income countries, where fatalities may be underreported by 20%. This highlights the urgent need for enhanced pedestrian safety in these regions.

Behavioral factor systems used in high-income countries to classify pedestrian behaviors may not translate well to low-income countries due to differences in legal, cultural, and infrastructural contexts. The absence of pedestrian facilities in low-income cities can lead to unfamiliarity with behaviors related to these facilities, questioning the validity of the factorial structure of pedestrian behaviors in most high-income contexts when applied to the distinct and varied conditions of areas in low-income countries.

Risk perception is key to pedestrian behavior, with complex interactions between place attachment and identity. However, research on the connection between these factors and pedestrian risk perception, especially in less developed areas, is limited. Environmental factors like sidewalk quality (continuity and maintenance of sidewalks, their width, and the separation from traffic) and traffic dynamics (like speed, volume, and the presence of parked vehicles) are also significantly associated with risk perception, shaping how pedestrians view the safety of their environment.

Our study aims to

- Establish the factorial structure of pedestrian behavior in Khost, Afghanistan, where certain pedestrian facilities like crossings, bridges, or underpasses are lacking.
- Explore the complex relationship between the sample's local environmental risk perception (in Khost) and pedestrian behavior, further analyzing how this perception is influenced by place attachment and identity, along with environmental factor perceptions.



- Assess perceptions of the same sample (from Khost) about a relatively more developed urban setting in Tehran, analyzing the impact of place attachment and identity on risk perception.

## **Research Methodology**

We collected 616 questionnaires from students at four Khost universities, who consented to participate in our survey. The universities included Shaikh Zayed University, Dawat University, Ahmad Shah Abdali Institute of Higher Education, and Tolo-E-Aftab Institute of Higher Education.

Participants viewed two videos of built environments from Khost and Tehran, with the latter's origin undisclosed to prevent biasing the participants' sense of place. Post-viewing each video, we assessed their risk perception, place attachment, identity, and environmental perceptions. Pedestrian behavior in Khost was also measured. We employed previously established and validated instruments to ensure the reliability and validity of our measurements.

To decipher the factorial structure of pedestrian behavior, we employed Principal Component Analysis (PCA) followed by Confirmatory Factor Analysis (CFA). PCA was similarly applied to categorize the respondents' sense of place into dimensions of place attachment and identity. Additionally, perceptions of the built environment were classified into components of traffic features and sidewalk features.

Structural Equation Models (SEMs) were constructed to analyze the relationships between place attachment, identity, and environmental features, and their impact on risk perception, based on Tehran video feedback. A similar SEM with Khost video data also considered pedestrian behavior's role in risk perception.

## **Results**

Our analysis revealed a three-factor construct for pedestrian behavior, encompassing lapses, transgressions, and aggressions. Notably, Afghan participants exhibited a stronger sense of attachment to the place depicted in the Tehran video compared to their local environment in Khost, although their sense of place identity did not significantly differ between the two locations. The sidewalk and traffic features in the Tehran video were perceived as safer relative to those in the Khost video.

In both Structural Equation Models (SEMs), place attachment was inversely related to pedestrian traffic risk perception, indicating that stronger place attachment is associated with lower perceived risk. Conversely, place identity was positively linked to risk perception exclusively in the Khost video, suggesting that a stronger sense of identity may heighten risk awareness in familiar environments. Additionally, the presence of riskier sidewalk and traffic features correlated significantly with increased risk perception for both locations. Finally, risk perception showed a negative association with pedestrians' lapses and transgressions, implying that higher perceived risk could potentially reduce these behaviors.



## Discussion and Conclusions

The stronger place attachment to Tehran's environment, as opposed to Khost, suggests that urban design and infrastructure play pivotal roles in fostering a sense of security and belonging, which can influence risk perception. This finding is particularly relevant for urban planners and policymakers aiming to enhance road safety in rapidly urbanizing areas.

The inverse relationship between place attachment and risk perception underscores the need for inclusive road safety strategies that consider emotional and psychological connections to urban spaces. Meanwhile, the positive link between place identity and risk perception in familiar environments highlights the importance of community engagement in road safety initiatives.

The significant correlation between the presence of riskier sidewalk and traffic features with increased risk perception underscores the need for urban design interventions that prioritize pedestrian safety. Our findings suggest that by enhancing the visibility and safety of sidewalks and traffic features, urban planners can directly influence pedestrians' risk perception, thereby potentially reducing lapses and transgressions.

In conclusion, our findings advocate for a holistic approach to road safety that encompasses not only the physical aspects of the built environment but also the subjective experiences of individual pedestrians. As we move towards more inclusive urban spaces, it is imperative that road safety interventions are designed with an understanding of the complex interplay between place attachment, identity, and risk perception.