9^{th} International Conference on Computational Social Science IC^2S^2
July 17-20, 2023, Copenhagen, Denmark

Gender gaps between urban mobility and insecurity

Keywords: mobility, fear, insecurity, gender gaps

Extended Abstract

Crime and violence are long-standing social phenomena that have been studied from a variety of perspectives. The occurrence of a crime has psychological, perceptual, and behavioral consequences for victims and those close to them. Measuring and evaluating the perception of insecurity becomes relevant as it is experienced as a feeling of vulnerability and lack of protection against the possibility of being a victim of crime, negatively impacting people's quality of life by impacting their routines, modifying their lifestyles, and altering their relationships with others [2]. These measures can be passive, such as distancing oneself in space and time from potential aggressors or modifying travel patterns, destinations, or routes [10].

Although fear and personal insecurity are present throughout society, certain groups of people are or feel more vulnerable [10]. Individual factors play an important role in defining the risk of victimization as well as the general perception of safety [2]. Previous victimization (or knowledge of others' victimization) is often considered a determinant of a person's fear, although research findings may be contradictory [7, 9]. In more vulnerable groups, the rate of victimization is lower.

A specific element of women's perceived insecurity and habit changes compared to men is strongly linked to crime victimization, as they are generally socially and physically more vulnerable to crime, as they tend to have less physical strength and less ability to fight back [10, 2]. At the same time, a greater sense of insecurity in women is determined by the characteristics or incivilities of the physical environment and the residential neighborhood [1]. The literature points out that women's greater fear of crime, compared to men, can be largely explained by the fear of being a victim of a sexual crime, this is the "shadow sexual assault hypothesis" [3]. This fear is associated with behavioral changes or responses that limit women's activities and mobility when they perceive specific places or areas as unsafe [8].

The main objective of this research is to study the relationship between the feeling of insecurity and mobility of people, differentiating this relationship by gender, in the city of Santiago, Chile. From a methodological perspective, the novelty of our study lies in the use of mobility measures constructed from digital traces of mobile devices. The use of mobile devices has made it possible to explore the mobility of people and their patterns in the city on a larger scale [5, 4]. Using this approach, and computing two measures of mobility, number of trips, and their entropy, Gauvin et al. [4] observe a gender gap in the urban area of the city of Santiago, Chile: women visit fewer unique locations than men and distribute their time less regularly among those locations. To study the extent to which insecurity explains this gap, we computed measures of insecurity from the ENUSC survey, an instrument developed and implemented by the National Institute of Statistics of Chile. Specifically, we constructed an indicator of emotional insecurity. The emotional factor refers to fear of dangerous situations or places. This dimension of insecurity was measured in different urban contexts: buses, bus stops, subway, collective taxis, neighborhood squares, and parks, neighborhood sports courts, and streets.

The correlation between mobility and perceived lack of safety was analyzed utilizing the Pearson correlation index. Causality and the gender gap were examined through linear regression

analysis, utilizing the Ordinary Least Squares (OLS) method, with insecurity as the independent variable, a dummy variable representing gender, and its interaction with insecurity. A joint significance test was conducted as evidence of a relationship between mobility and insecurity differentiated by gender [6]. To ensure robustness and validity of the results, bootstrapping and Bayesian estimates were applied.

The results indicate a causal relationship, suggesting that mobility decreases in the presence of a higher perception of insecurity. This relationship, while present among both men and women, is found to be stronger among women, who tend to further reduce their mobility in places such as buses, bus stops, neighborhood squares, parks, and sports courts, as well as on the street, when perceiving the same level of insecurity (Table 1). It is concluded that gender alone does not fully explain mobility patterns. While there is a gender gap in mobility, with women moving less than men [4], this reduction is even more pronounced when controlling for perceptions of insecurity.

References

[1] M. Börjesson. Valuing perceived insecurity associated with use of and access to public transport. *Transport Policy*, 22:1–10, 2012.

[2] V. Ceccato, L. Langefors, and P. Näsman. The impact of fear on young people's mobility. *European Journal of Criminology*, page 14773708211013299, 2021.

[3] K. F. Ferraro. Women's fear of victimization: Shadow of sexual assault? *Social forces*, 75(2):667–690, 1996.

[4] L. Gauvin, M. Tizzoni, S. Piaggesi, A. Young, N. Adler, S. Verhulst, L. Ferres, and C. Cattuto. Gender gaps in urban mobility. *Humanities and Social Sciences Communications*, 7(1):1–13, 2020.

[5] M. C. Gonzalez, C. A. Hidalgo, and A.-L. Barabasi. Understanding individual human mobility patterns. *nature*, 453(7196):779–782, 2008.

[6] W. H. Greene. *Econometric analysis*. Pearson Education India, 2003.

[7] C. Hale. Fear of crime: A review of the literature. *International review of Victimology*, 4(2):79–150, 1996.

[8] J. M. Miller. *The encyclopedia of theoretical criminology*. John Wiley & Sons, 2014.

[9] M. D. Otis. Perceptions of victimization risk and fear of crime among lesbians and gay men. *Journal of Interpersonal Violence*, 22(2):198–217, 2007.

[10] J. Stark and M. Meschik. Women's everyday mobility: Frightening situations and their impacts on travel behaviour. *Transportation research part F: traffic psychology and behaviour*, 54:311–323, 2018.

Table 1: Correlation between mobility and emotional insecurity (locations).

	Male entropy	Female entropy	Male trips	Female trips
Buses	-0.35^b	-0.64^a	-0.43^b	-0.68^a
Collective taxis	-0.20	0.02	-0.17	0.02
Subway	-0.26	-0.30	-0.35^b	-0.35^b
Neighborhood square	-0.42^b	-0.78^a	-0.49^a	-0.83^a
Neighborhood sport court	-0.28	-0.68^a	-0.37^b	-0.79^a
Bus stops	-0.34	-0.78^a	-0.45^a	-0.82^a
Street	-0.37^b	-0.64^a	-0.47^a	-0.67^a

x^a correlations are statistically significant at $p < 0.01$ and x^b statistically significant at $p < 0.05$.