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Personal security and daily travel in sub-Saharan Africa: the case of Dakar

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Abstract

In both the cities of the North and the South, personal security is one of the factors that determine the use of transport modes. Personal security relates to a wide range of documented incidents: theft of money or property, with or without violence, physical or verbal assaults, intimidation, sexual harassment, etc. Both with regard to improving knowledge about daily mobility and to developing and evaluating transport policies, it is necessary to understand the prevalence of personal security concerns in transport among urban dwellers and to highlight how individual factors influence perceived insecurity. To answer this question, we have considered the case of Dakar, a metropolis in West Africa, on the basis of data from a household travel survey conducted in 2015. We present the main findings on perceived and experienced insecurity during walking and public transport trips, focusing on individual factors such as gender, physical disability, and household income. In a metropolis that is undergoing rapid spatial development such as Dakar, where most trips are made on foot and by public transport, a high number of people feel at risk, especially among women, and persons with a handicap. Experienced insecurity is far from being a secondary problem in the analysis of the travel difficulties of Dakar's residents. It is greater in vehicles than at public transport stops. These initial findings appear to be consistent with those presented in the literature review. They raise the issue of the poor design and lighting of public spaces and for pedestrian walkways. While improving perceived security, especially for women, requires specific consideration and measures, it also requires a more overarching improvement in public transport provision and measures to create walking-friendly neighborhoods.

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1. Introduction

In both the cities of the North and the South, meeting travel needs and the ways in which mobility is achieved are influenced by many factors. These factors relate in particular to the characteristics of urban dwellers (age, gender, employment status, position in the household, etc.), those of their household (composition, income, etc.), and their daily environment (accessibility, public transport services, according to the location of their dwelling). They determine a range of personal resources and constraints. These resources include the possibility of having access to a personal vehicle, the availability and affordability of public transport services, knowledge about transport services and physical capacities, all of which are resources that can be called on to successfully perform daily mobility. Any of these resources that are missing can be transformed into constraints, or difficulties, with regard to mobility.

Personal security is one of the factors that determine the use of transport modes. Admittedly, highlighting the fear of being assaulted may in some cases be a way of justifying practices that are influenced by other determinants (Pearlstein and Wachs, 1982; Mattioli, 2014). Studies including self-reported measures of attitudinal factors can lead to "social desirability bias" (Nordfjaern et al., 2015, p. 159). While such biases exist, many studies focusing on cities of the North show, however, that personal security is an essential aspect of travel.

Various studies have shown that the use of public transport depends on the level of personal security when travelling (Carruthers et al., 2005; Suman et al., 2017). Thus, an insufficient level of security may lead users to use more expensive modes (World Bank, 2002) or to reduce their range of modal choices by discontinuing or limiting their use of public transport (Zhang, 2016). However, examples from both the North (d'Arbois de Jubainville and Vanier, 2017) and the South (Page and Oni, 2002) show that modal transfer due to insecurity is restricted by other supply characteristics, such as affordability in relation to household budgets and availability in terms of routes, services or schedules. They also depend on the trip purpose, having a greater impact on leisure trips (Nordfjaern et al., 2015).

The issue of personal security also plays a role when walking (World Bank, 2002), be it end-to-end walking trips or walking as part of intermodal trips. Based in particular on findings from Loukaitou-Sideris (2006) and McDonald (2008), Zhang (2016) has argued that a decrease in the crime rate increases the potential for non-motorized modes, such as walking. A negative perception of travel risk, and more generally risk in public spaces, can lead individuals think about not doing some activities, either for themselves or for dependents such as children and young people (Porter et al., 2010).

In both public transport and on foot, fear of being assaulted or harassed is particularly prejudicial for certain population groups: the poor, the elderly, children and adolescents, the disabled, women, people who reside in areas with precarious housing. Sometimes, this impact also results, locally, in a deterioration of night-time services, as drivers may refuse to enter certain areas because they are afraid of violence or theft (Diaz Olvera et al., 2016a; Maia et al., 2016). Such impacts reduce the extent to which transport services contribute to reducing social exclusion (Newton, 2004).

Both with regard to improving knowledge about daily mobility and to developing and evaluating transport policies, it is necessary to understand the prevalence of personal security concerns in transport among urban dwellers and to highlight how individual factors and factors that are related to the spatial context of travel influence perceived insecurity. To answer this question, we have considered the case of Dakar, a metropolis in West Africa, on the basis of data from a household travel survey conducted in 2015. After presenting the literature review on personal security (2), the data we have used and the urban context of Dakar (3), we will present the main findings on perceived and experienced insecurity during walking and public transport trips, focusing on individual factors.

2. Literature review

2.1. Defining personal security

Personal security involves a wide range of documented incidents: theft of money or property, with or without violence, physical or verbal assaults, intimidation, sexual harassment, etc. It also involves transport users' perception of the risky situations they encounter when travelling. However, it is essential to distinguish unambiguously between perceived and experienced security. The perception of security is based on actual experiences as a victim but also on events observed as a witness and, more generally, on knowledge of various reported incidents, sometimes exaggerated,

by word of mouth or by the media (Pearlstein and Wachs, 1982, concerning the use of buses in Los Angeles). The perception of danger on transport and in public spaces is thus comparatively unrelated to personal experience of an assault or the observed crime rate (Carro et al., 2010; Currie et al., 2010; Hirschfield, 2008; Jackson and Gray, 2010).

A second distinction must be made regarding the location of offences. Newton (2008) observed that the analysis of personal security in public transport focused mainly on criminal events that occur at or around bus stops and much less on those that occur during the journey in the vehicle. One of the reasons given for this is the difficulty of identifying the exact location of the attack in a moving vehicle. However, analyses of personal security, whether general or specifically for the transport sector, primarily highlight two main categories of determinants of criminal behavior, those relating to the individuals in question and those relating to the area in which the incident took place. Implementing "non-static" approaches is particularly problematic when we are unable to identify the environment outside the vehicle.

2.2. Contextual and individual determinants

The contextual determinants that have been identified relate to the characteristics of the neighborhood of residence and to the immediate environment throughout the trip. Perceived danger depends on the socio-economic make-up of the neighborhood of residence (poverty, diverse population, high immigrant rates), the level of residential turnover or commuting, the degree of social cohesion and trust in neighbors, and more broadly on the quality of the environment (presence of graffiti or garbage) (Newton and Ceccato, 2015; Zhang, 2016). Lack of knowledge of the location also contributes to a greater sense of danger in places far from home (Hirschfield, 2008). Some of these factors also occur during a trip. Thus, functional diversity, like high density, seems to affect the number of crimes around public transport stops or stations (Zhang, 2016). The experience of danger in buses is greater in the most disadvantaged areas and in highly crime-prone areas with "an over-representation mobile single-person households and high residential turnover" (Newton, 2008, p. 98). In the townships of South African cities, the lack of street lighting and pedestrian infrastructure contributes to the high exposure of resident populations (Kruger and Landman, 2008). Anand and Tiwari (2006) also mention the physical characteristics of the infrastructure, the lack of lighting around stops, and the poor quality of pedestrian walkways as factors that are likely to increase risk.

Personal security also depends on the specific characteristics of urban dwellers. The issue of insecurity is directly linked to gender inequalities in access to urban spaces. The right of women to access public spaces is linked more broadly to the place they are assigned in society. In many urban contexts, in the countries of the South in particular, women are frequently confined to private spaces or areas near their homes, making their presence in public spaces less legitimate, while men are free to pursue their activities in them. Women's strong perception of insecurity in transport appears to be consistent with more general findings on the determinants of perceived insecurity (Austin et al., 2002). In line with the general observation that "Safety and security in public transport are crucial issues which disproportionately affect women" (Peters, 2011, p. 9), some studies show that a large number of women do not feel safe when using public transport and more broadly when they are in public spaces. These findings apply to urban environments both in the North (Clifton and Livi, 2005; Loukaitou-Sideris, 2006; Mattioli, 2014; Yavuz and Welch, 2010) and in the South (Anand and Tiwari, 2006; Monqid, 2011; Paul, 2008; Peters, 2011; Suman et al., 2017; Turner, 2012; Uteng, 2012; World Bank, 2011).

Women are more often the victims of certain forms of insecurity. Thus, the risks of sexual harassment or physical assault of women by men are highlighted in many urban environments (Anand and Tiwari, 2006; Dunckel-Graglia, 2013; Hancock, 2006; Mejia-Dorantes, 2018; Paul, 2008; Turner, 2012). Vehicle overcrowding, which is common during rush hour (Tillous, 2017) and jostling at stops to board vehicles (Page and Oni, 2002) both increase the risk of touching and assault and also make it more difficult to identify the perpetrators and characterize the incidents (Hickey, 2014). The risk is further increased by the fact that the perpetrators may not only be other passengers but also the drivers and conductors, which are almost exclusively male occupations (Harrison, 2012; Mejia-Dorantes, 2018; Peters, 2011; Viswanath and Mehrota, 2007).

While women are particularly affected by personal security issues in their travel, other groups may also feel vulnerable during their trips, such as the poor, people with disabilities, the elderly, children and the young (Carro et al., 2010; Delbosc and Currie, 2012; Loukaitou-Sideris and Eck, 2007; Newton and Ceccato, 2015).

In this paper, we shall attempt to analyze the effects of individual characteristics on perceived and experienced insecurity in Dakar with regard to travel practices.

3. Data and the study area

3.1. Personal security in the EMTASUD survey

To study the issue of security during urban travel, we have analyzed a household travel survey conducted in May–June 2015. This was the Dakar Mobility, Transport and Access to Urban Services Survey (*Enquête Mobilité, Transports et Accès aux Services Urbains de Dakar – EMTASUD 2015*) which was conducted for the Executive Board for Public Transport in Dakar (*Conseil Exécutif des Transports Urbains de Dakar, CETUD; Sitrass-Curem, 2016*). After stratifying the Dakar region into 41 areas, a two-stage sample selection process was conducted: 419 census districts were selected from the 41 strata, followed by the random selection of households after counting the population within each census district. The interviews were conducted by trained interviewers in the homes of 3,176 households in which 13,415 individuals aged 11 years and over were interviewed individually.

A section of the individual questionnaire addressed the perception of insecurity and the experience of insecurity in travel. The perception of insecurity was assessed through two sets of questions (of the form "Are you afraid of being robbed or assaulted when you travel alone?"), which distinguished between the daytime and night-time periods, the mode of transport (walking, public transport, car) and, for walking, whether the space visited is in or outside the respondent's residential district. The experience of insecurity is also addressed by two sets of questions, asking the respondent if he or she has personally encountered a variety of problems (theft of money, theft of a telephone, theft of other property, verbal assault, physical assault, harassment), either on board vehicles or at stops. The reporting period was almost a year and a half (from January 2014 to the date of the survey).

3.2. Dakar: an expanding city

The Dakar region, which is the area of the Dakar metropolis, consists of the departments of Dakar, Guédiawaye, Pikine and Rufisque (Fig. 1). With more than 3 million inhabitants in 2013 compared to 1.3 million in 1988, its population has more than doubled in 25 years (ANSD, 2014; Sakho, 2002; Syscom, 2001). The population growth rate has slowed in the 21st century (an increase of 3% per year between 2000 and 2013 compared to 4.2% between 1988 and 2000). The shape of the Cape Verde peninsula, where the Dakar region is located, has a major influence on the direction of urbanization and the layout of roads, with one-way development in the direction of Pikine, Guédiawaye and Rufisque (Sakho, 2002; Sakho, 2014). Population growth is high in the departments of Rufisque and Pikine. The latter, in particular, is now more populated than the department of Dakar (Table 1).

Undeveloped areas, which are often unsuitable for housing, are rapidly becoming urbanized while the southern tip of the peninsula brings together many administrative, economic and service activities. The separation between places where people work and live is particularly marked and Dakar appears to be a "compartmentalized city" (Lombard et al., 2006, p. 199). The cost of daily access to downtown Dakar is too high for many people living on the outskirts (Bertoncello, 2008). However, very rapid urbanization and population growth, and the lack of public facilities (Ndiaye, 2016) and jobs on the periphery intensify the need for motorized travel. In 2000, 60% of the working population were employed in Dakar and 15 years later, this proportion is still high (58%), despite an increase in jobs in Pikine (from 23% to 26%).

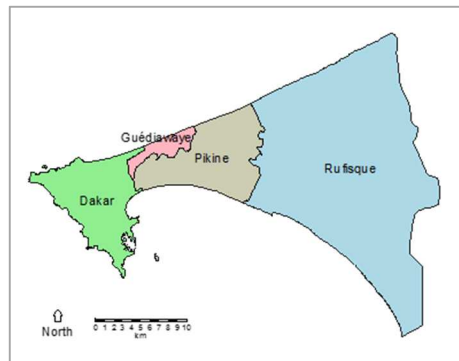


Fig. 1. The Region of Dakar.

Table 1. Distribution of the population of the Region of Dakar according to the department in 2002-2013 (%).

	2002	2013
Dakar	40,3	36,5
Guédiawaye	12,1	10,5
Pikine	35,2	37,3
Rufisque	12,3	15,6
Region of Dakar (million inhabitants)	2,19	3,05

Source: ANSD, 2014, population censuses. Calculations by the authors.

3.3. Household car ownership: still limited

Sub-Saharan African cities are characterized by very low car ownership rates (Diaz Olvera et al., 2013). The region of Dakar is no exception. Although the household car ownership is increasing, it is still very low (12% of households had a car in 2010 and 15% in 2015). The ownership of cars is restricted to the better-off households and given that the average household size is high (6 individuals), access to a personal car is restricted in average to one resident (aged 14 years old and over) out of twenty. The ownership of two-wheelers (motorcycles in particular) is still marginal but increasing.

3.4. Public transport: highly varied provision

Public transport (PT) is characterized by its diversity in terms of the size of vehicles and the characteristics of the operators. The current para-public company Dakar Dem Dikk (DDD) was created in 2000. Services are concentrated in the Dakar department or connect the other departments to Dakar. The share of PT market captured by DDD buses is modest (7%). AFTU buses, commonly known as *tatas*, were created with the support of CETUD and the World Bank, to better organize and professionalize the public transport sector. They now play a central role (36% of public transport trips).

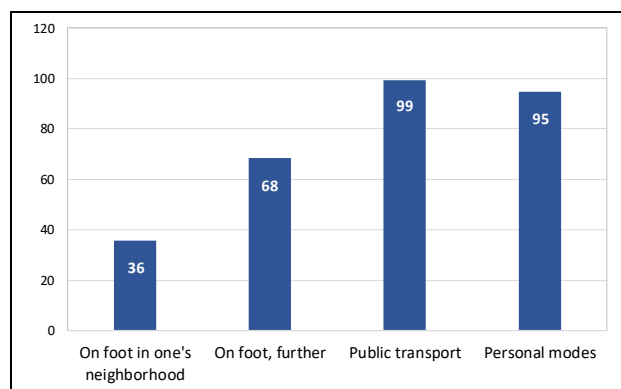
Several forms of paratransit also have a significant presence: *Ndiaga Ndiaye* (45 seats), *cars rapides* (20 seats), unlicensed shared taxis (*clandos*) and meter taxis. *Ndiaga Ndiaye* (4% of PT trips) operate on relatively long links between the centre and outlying area. *Cars rapides* (20% of the market) provide shorter services, often feeding AFTU or DDD routes. *Clandos*, which are private cars used as unlicensed shared taxis, operate on "recurrent and well-organized" routes, most often on the outskirts (Lammoglia, 2013, p. 74) and capture 12% of PT trips. Finally, meter taxis, of which there are many on Dakar's main roads, are also widely used (more than 10% of PT trips).

According to the household travel survey, the quality of service of public transport is often considered to be unsatisfactory by users: the *Ndiaga Ndiaye* provide poor services to residential areas, the *cars rapides* are slow and carry a high risk of road accidents, while the DDD buses suffer from long waiting times and overloading, and the *tatas*

are overloaded (Sitrass-Curem, 2015). Frequent failure to comply with routes and frequencies is also reported (Orrico Filho et al., 2015). While clandestine and meter taxis are generally regarded favorably, such reactions are counterbalanced by fares that are deemed too high, particularly for meter taxis.

3.5. Modal use and travel-time budgets, signs of exposure to insecurity

Walking is an essential component of Dakar's transport system and accounts for nearly 70% of all trips (compared with 24% for public transport and 6% for private modes). Its importance for mobility is even greater because it is frequently combined with public transport travel, and sometimes involves considerable distances (initial and final legs may be long, and walking is sometimes used to reduce the cost of public transport travel; Diaz Olvera et al., 2016b). Identifying modal profiles for the previous day makes it possible to determine modal usage during a day (Fig. 2). Many Dakar residents travelled only on foot and stayed in their neighborhood (29% of urban dwellers). Those who travelled only on foot and left their neighborhood accounted for 13% of Dakar's residents. Users of public transport represented 35% of the population of Dakar compared to 6% for users of personal modes (who may also have used public transport and walked). Nearly one in six Dakar residents did not travel at all on the previous day. These results show that for the majority of urban dwellers, access to the city is closely linked to the availability of public transport. Average travel time budgets become substantial as soon as residents leave their neighborhood (Fig. 2). Reflecting difficult travel conditions (traffic jams, saturation of public transport during peak hours, lack of specific infrastructure for walking), these high durations suggest high exposure to risk.



Source: EMTASUD 2015, calculations by the authors.

Fig. 2. Travel time budget according to the previous day's modal use (individuals aged 11 years and over, Monday – Saturday, in minutes).

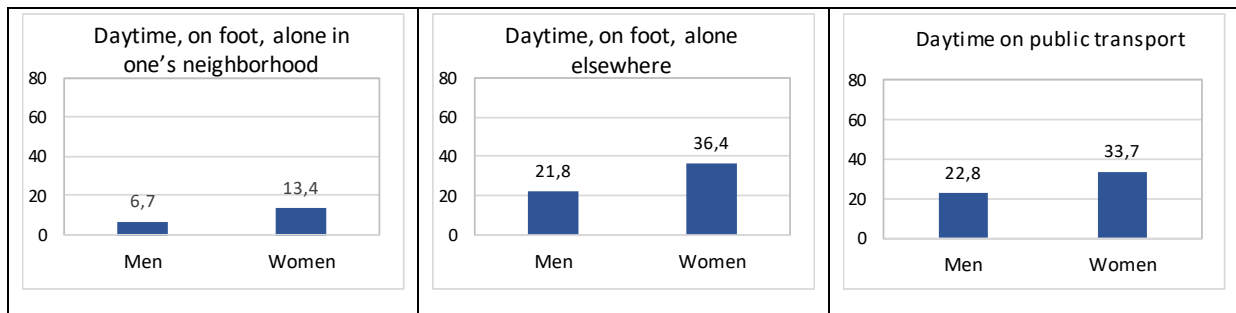
4. The individual determinants of insecurity in Dakar

4.1. Perceived insecurity

Omnipresent in the literature, the particular importance of gender in the perception of insecurity is clearly apparent in Dakar. Whether when using public transport or walking, the perception of insecurity is more frequent among women than men: +7 percentage points during the day for walking in their neighborhood, +15 percentage points for walking outside their neighborhood, and +11 percentage points for daytime public transport use (Fig. 3).

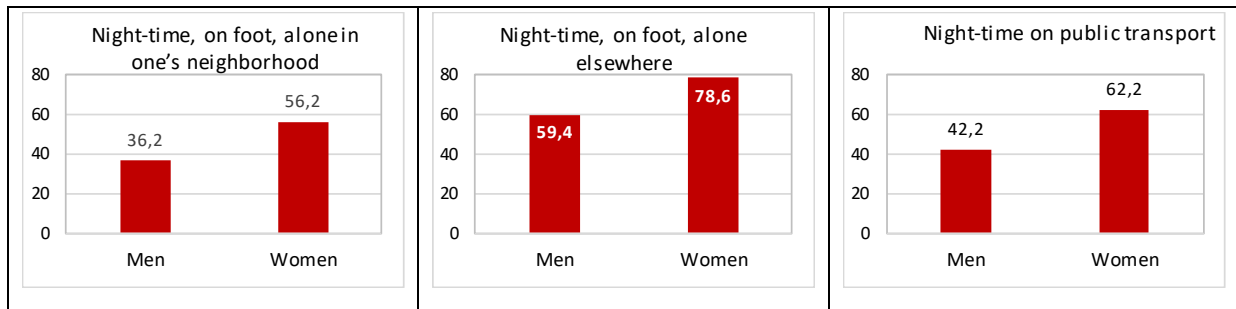
In a context where the lack of lighting is the most common impediment to walking identified by both men (mentioned by 64%) and women (63%), perceived insecurity is stronger at night than during the day. Out-of-district trips are more feared than those made in the neighborhood and, in both situations, the disparity between men and women is widening (Fig. 4). Even in the familiar space of the neighborhood, more than one in two women express anxiety about walking at night.

In the case of public transport, the fear of travelling at night is mentioned by more than six out of ten women (compared with four out of ten men).



Source: EMTASUD 2015, calculations by the authors.

Fig. 3. Perceived insecurity in different travel situations, according to gender, in the daytime (% of individuals aged 11 years and over).



Source: EMTASUD 2015, calculations by the authors.

Fig. 4. Perceived insecurity in different travel situations, according to gender, in the night-time (% of individuals aged 11 years and over).

Only two other individual factors, household income and having a disability which makes travel difficult, have a significant effect, regardless of gender, on perceived insecurity. Income has an opposite effect for night-time walking in one's neighborhood and daytime travel outside one's neighborhood, whether on foot or by public transport (Fig. 5). In the first case, insecurity is less frequently perceived when household income rises, which may be because individuals with high incomes tend to live in a district with a more secure environment. Outside one's neighborhood, the opposite is true, more women and men in high-income households feel insecure. This may simply reflect the contrast with the relative peacefulness of their residential space, and may also reflect mobility that is more directed towards the city than towards the neighborhood (and which thus entails greater exposure to the risk of theft or assault outside the neighborhood). The influence of income thus underscores the importance of contextual characteristics in perceived insecurity.

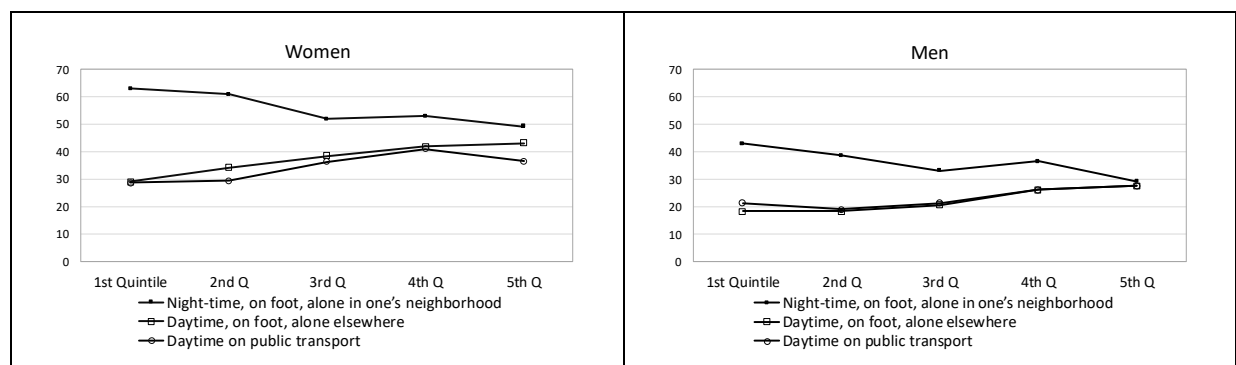


Fig. 5. Perceived insecurity in three travel situations according to per capita income quintile among women and men (% of individuals aged 11 years and over).

Having a disability which makes travel difficult (which is the case for 9.6% of women and 6.4% of men) leads more people to perceive a risk of insecurity. This effect is more pronounced for daytime travel (with the highest relative differences being among women: +7 percentage points for walking, and +12 percentage points for the use of public transport). For both women and men, the differences are much smaller for walking or using PT at night, perhaps because they travel at night more rarely than other people.

4.2. Experienced insecurity

Experienced insecurity in public transport is much more widespread than perceived insecurity (Table 2): 24.4% of women and 23.6% of men have had at least one problem in the last year and a half. This experience of insecurity takes a different form depending on gender, as women are slightly less likely to be victims of theft and slightly more likely to be victims of harassment or verbal assault. But the differences seem too small to explain most of the observed gaps in perceived insecurity according to gender.

Table 2. Problems encountered during PT use between January 2014 and May-June 2015, for individuals aged 11 years and over, according to gender (%).

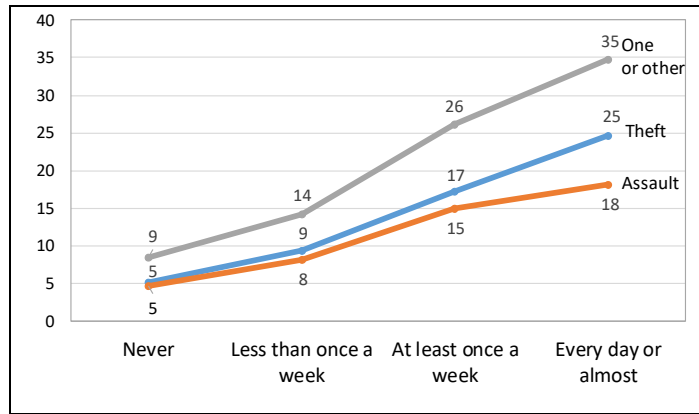
% having experienced...	... waiting at a stop		... on the vehicle	
	Men	Women	Men	Women
... theft of money	2.7	3.1	5.2	5.1
... cellphone theft	5.4	4.4	9.9	8.8
... another type of theft	1.7	1.9	2.6	3.5
... verbal assault	4.3	4.6	7.8	8.1
... harassment	3.7	3.7	5.4	6.2
... physical assault	1.3	1.2	1.5	1.3

Source: EMTASUD 2015, calculations by the authors.

5. Risk exposure, experienced insecurity and perceived insecurity: how are they related?

The foregoing results should be seen in relation to public transport use. Logically, the risk of assaults or robberies increases with the frequency of PT use, even though one would imagine that this also helps individuals acquire knowledge of the risks involved and individual strategies to limit the occurrence of incidents. On the basis of the frequency of public transport use, it is possible to relate risk exposure to experienced insecurity (Fig. 6) and perceived insecurity (Fig. 7).

If we exclude the 4% of city dwellers who never use public transport, it appears that daily users of public transport report having been the victims of theft much more often than those who rarely use it (by 16 percentage points); the impact on attacks, although smaller (10 percentage points), is still clear (Fig. 6). The effect of the level of PT usage on experienced insecurity is more marked among women. Among daily users of public transport, 26% of women had been victims of theft and 20% had been assaulted compared to 24% and 16% respectively for men. However, regardless of the frequency of public transport use, the more negative female perception of security on foot or in public transport persists.

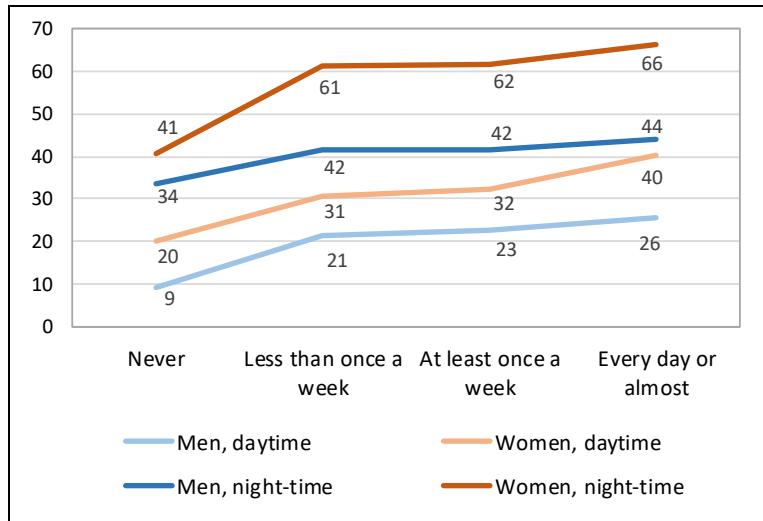


Theft: has suffered a theft of money, telephone or other property, in a public transport vehicle or at a stop; Assault: has suffered a verbal assault, a physical assault or been harassed in a public transport vehicle or at a stop. Source: EMTASUD 2015, calculations by the authors.

Fig. 6. Percentage of city dwellers who were robbed or assaulted on public transport between January 2014 and May-June 2015, according to frequency of PT use.

Perceived insecurity during PT use is less sensitive to frequency of use than experienced insecurity, once non-users have been excluded (Fig. 7). The effect of exposure amounts to a stronger perception of insecurity during the day (but not at night) among daily users, perhaps because their PT use takes place mainly during the daytime. The differences of perceived insecurity according to time of day or gender are, in comparison, much larger. Men and women are significantly more likely to be afraid of travelling on public transport at night than during the day and, with similar frequency of use, women feel insecurity much more strongly than men: +10 to 15 percentage points during the day and + 20 percentage points at night.

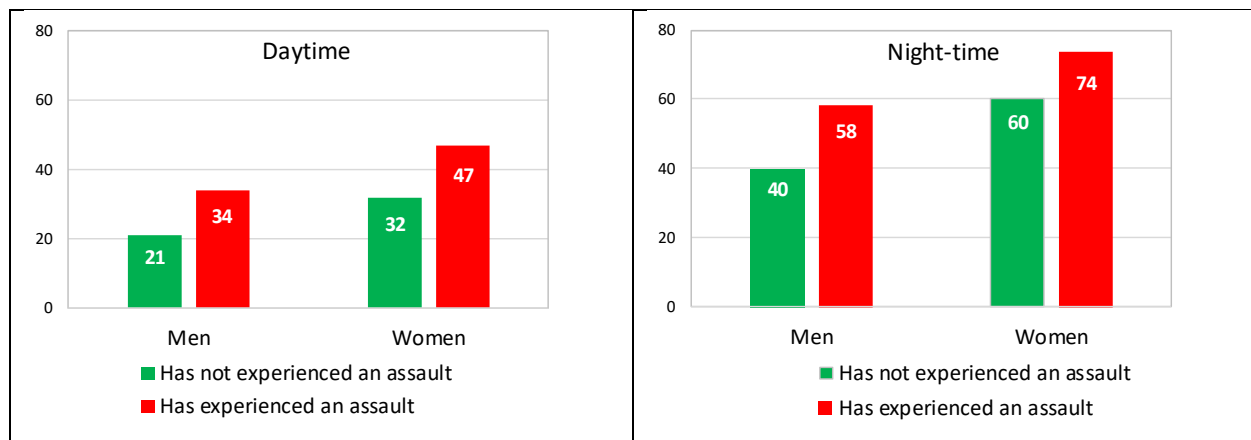
Perceived insecurity with regard to walking outside one's residential area is generally closely linked to insecurity with regard to the use of public transport. Nevertheless, there is little connection between the fear of walking outside one's neighborhood and the frequency of PT use. This is only the case for women during the day (+7 percentage points in the case of daily use).



Source: EMTASUD 2015, calculations by the authors.

Fig.7. Perceived insecurity of daytime/night-time PT use, according to frequency of use, for men and women (%).

Having been a victim of insecurity when using PT increases individuals' perception of insecurity on public transport. Attacks that have been experienced have the most negative impact on perception (Fig. 8), with differences that are twice as large as for thefts. However, the very large gender differences remain within each of the two categories.



Source: EMTASUD 2015, calculations by the authors.

Fig. 8. Individuals' perceived insecurity of PT use, by whether or not they have been assaulted.

6. Conclusion

In a general context where there is little available data on travel demand in the cities of sub-Saharan Africa (Diaz Olvera et al., 2013), studies of insecurity during urban travel in the sub-continent remain in their infancy. Our findings appear to be consistent with those presented in the literature review. However, they require further analysis, first of all regarding the weight of the various factors that are specific to the individual, but also on how contextual characteristics (of the neighborhood in which they live) influence perceived insecurity during the day and at night.

In a metropolis that is undergoing rapid spatial development such as Dakar, where most trips are made on foot and by public transport, it is very important for city dwellers to be able to travel without fear in public space and on public transport. For the time being, this remains an unfulfilled goal, as the number of people who feel at risk is high - more than half of individuals in the case of night-time travel outside their residential area. This raises the question of the poor design and lighting of public spaces and for pedestrian walkways. Given the percentages of people who have been victims of a criminal act over a period of a year and a half, experienced insecurity is far from being a secondary problem in the analysis of the travel difficulties of Dakar's residents. It is greater in vehicles than at public transport stops. These results should be seen in the context of the quality of service problems (overloading, low commercial speed, timetables that are difficult to follow, long waiting times, services in remote districts) encountered by the different types of transport services. While improving perceived security, especially for women, requires specific consideration and measures, it also requires a more overarching improvement in public transport provision and measures to create walking-friendly neighborhoods.

References

- Anand, A., Tiwari, G., 2006. A gendered perspective of the shelter–transport–livelihood link: The case of poor women in Delhi. *Transport Reviews*, 26(1), 63–80.
- ANSD, 2014. Recensement Général de Population et de l'Habitat, l'Agriculture et l'Élevage. Rapport Définitif RGPHAE 2013, Dakar : ANSD.
- Austin, D. M., Furr, L. A., Spine, M., 2002. The effects of neighborhood conditions on perceptions of safety. *Journal of Criminal Justice*, 30, 417–427.
- World Bank, 2002. *Cities on the Move*. The World Bank, Washington.

- Beecroft, M., Pangbourne, K., 2015. Future prospects for personal security in travel by public transport. *Transportation Planning and Technology*, 38(1), 131–148.
- Bertoncello, B., 2008. Disparités socio-spatiales recomposées et centralités émergentes : Les nouvelles cartes d'une gestion privatisée. In : S. Bredeloup, B. Bertoncello, J. Lombard, éd., Abidjan, Dakar : Des villes à vendre ? La privatisation made in Africa des services urbains, Paris : L'Harmattan, pp. 243–253.
- Carro, D., Valera, S., Vidal, T., 2010. Perceived insecurity in the public space: Personal, social and environmental variables. *Quality & Quantity*, 44(2), 303–314.
- Carruthers, R., Dick, M., Saurkar, A., 2005. Affordability of Public Transport in Developing Countries. *Transport Papers*, Washington: The World Bank Group.
- Clifton, K. J., Livi, A. D., 2005. Gender differences in walking behavior, attitudes about walking, and perceptions of the environment in three Maryland communities. In: *Research on Women's Issues in Transportation*, Vol. 2 : Technical Papers. Washington: Transport Research Board, pp. 79–88.
- Currie, G., Delbosc, A., Mahmoud, S., 2010. Perceptions and realities of personal safety on public transport for young people in Melbourne. 33rd Australasian Transport Research Forum Conference, Canberra 29 Sept–01 Oct.
- Delbosc, A., Currie, G., 2012. Modelling the causes and impacts of personal safety perceptions on public transport ridership. *Transport Policy*, 24, 302–309.
- Diaz Olvera, L., Plat, D., Pochet, P., 2013. The puzzle of mobility and access to the city in Sub-Saharan Africa. *Journal of Transport Geography*, 32, 56–64.
- Diaz Olvera, L., Guézéré, A., Plat, D., Pochet, P., 2016a. Earning a living, but at what price? Being a motorcycle taxi driver in a Sub-Saharan African city. *Journal of Transport Geography*, 55, 165–174.
- Diaz Olvera, L., Plat, D., Pochet, P., 2016b. Changes of daily mobility patterns in Dakar (Senegal), World Conference on Transport Research 2016, Shanghai, 10-15 July.
- Dunckel-Graglia, A., 2013. Women-only transportation: How “pink” public transportation changes perception of women's mobility. *Journal of Public Transportation*, 16, 85–105.
- Hancock, P., 2006. Violence, women, work and empowerment: Narratives from factory women in Sri Lanka's export processing zones. *Gender, Technology and Development*, 10(2), 211–228.
- Harrison, J., 2012. Gender segregation on public transport in South Asia: A critical evaluation of approaches for addressing harassment against women. MSc in Development Studies, University of London.
- Hickey, G., 2014. Anti-harassment campaigns for mass transit in the 21st century US: A critique from history, *Proceedings of the 5th International Conference on Women's Issues in Transportation*, TRB – ISFTTAR – TRA, April 14-16, Paris:FIA, pp. 365-376.
- Hirschfield, A., 2008. The multi-faceted nature of crime. *Built Environment*, 34, 4–20.
- Jackson, J., Gray, E., 2010. Functional fear and public insecurities about crime. *British Journal of Criminology*, 50(1), 1–22.
- Kruger, T., Landman, K., 2008. Crime and the physical environment in South Africa: Contextualizing international crime prevention experiences. *Built Environment*, 34(1), 75–87.
- Lammoglia, A., 2013. Analyse et modélisation multi-agents de transports flexibles Comparaison de services français et sénégalais. Thèse de Docteur, spécialité Géographie et Informatique Univ. d'Avignon et des Pays de Vaucluse, France – Univ. Cheikh Anta Diop de Dakar, Sénégal.
- Lombard, J., Bruez, F., Diakho, A., 2006. Les transports sénégalais à l'aune du système-monde. In : Lombard, J., Mesclier, E., Velut, S., éd., La mondialisation côté Sud. Acteurs et territoires. Paris : IRD Editions – ENS, pp. 183–202.
- Loukaitou-Sideris, A., Eck, J. E., 2007. Crime prevention and active living. *American Journal of Health Promotion*, 21(4), 380–389.
- Loukaitou-Sideris, A., 2006. Is it safe to walk? Neighborhood safety and security considerations and their effects on walking. *Journal of Planning Literature*, 20(3), 219–232.
- Maia, M.L., Lucas, K., Marinho, G., Santos, E., de Lima, J.H., 2016. Access to the Brazilian city – From the perspectives of low-income residents in Recife. *Journal of Transport Geography*, 55, 132–141.
- Mattioli, G., 2014. Moving through the city with strangers? Public transport as a significant type of urban public space. In: T. Shortell, E. Brown ed., *Walking in the European City. Quotidian Mobility and Urban Ethnography*. Farnham: Ashgate, pp. 57–74.
- McDonald, NC, 2008. The effect of objectively measured crime on walking in minority adults. *American Journal of Health Promotion*, 22(6), 433–436.
- Mejia-Dorantes, L., 2018, An example of working women in Mexico City: How can their vision reshape transport policy?, *Transportation Research Part A*, 116, 97–111.
- Monqid, S., 2011. Les ailes lourdes : Pratiques urbaines des femmes des quartiers défavorisés de Rabat. *Justice Spatiale | Spatial Justice*, 3.
- Ndiaye, I., 2015. Étalement urbain et différenciation sociospatiale à Dakar (Sénégal). *Cahiers de Géographie du Québec*, 59 (166), 47–69.
- Newton, A., 2004. Crime on public transport: “static” and “non- static” (moving) crime events. *Western Criminology Review*, 5(3), 25–42.
- Newton, A., 2008. Study of bus route crime risk in urban areas: The changing environs of a bus journey. *Built Environment*, 34(1), 88–103.
- Newton, A., Ceccato, V., 2015. Theoretical perspectives of safety and security in transit environments. In: V. Ceccato, A. Newton, eds., *Safety and Security in Transit Environments. An Interdisciplinary Approach*. Basingstoke: Palgrave Macmillan, pp. 23–36.

- Nordfjærn, T., Lind, H. B., Şimşekoğlu, Ö., Jørgensen, S. H., Lund, I. O., Rundmo, T., 2015. Habitual, safety and security factors related to mode use on two types of travels among urban Norwegians. *Safety Science*, 76, 151–159.
- Orrico Filho, R.D., Ribeiro, R.G., Thiam, M.K., 2015. A comparative study of the organization of alternative transport in the cities of Rio de Janeiro and Dakar. *Case Studies on Transport Policy*, 3, 278–284.
- Page, O. and Oni, S., 2002. Impacts on travel mobility of criminal incidents on public transport systems: South Africa and Nigeria compared. In: X. Godard and I. Fatonzoun (eds.) *Urban Mobility for All, Proceedings of the International Conference CODATU X*, Rotterdam: Balkema, pp. 43-49.
- Paul, T., 2011. Space, gender, and fear of crime: Some explorations from Kolkata. *Gender, Technology and Development*, 15(3), 411–435.
- Pearlstein, A., Wachs, M., 1982. Crime in public transit systems: An environmental design perspective. *Transportation*, 11, 277–297.
- Peters, D., 2011. Gender and transport in less developed countries. Thematic study prepared for Global Report on Human Settlements 2013. Nairobi: UNDP.
- Porter, G., Hampshire, K., Abane, A., Robson, E., Munthali, A., Mashiri, M., Tanle, A., 2010. Moving young lives: Mobility, immobility and inter-generational tensions in urban Africa. *Geoforum*, 41, 796–804.
- Sakho, P., 2002. U comme Urbain ou développement urbain et transport à Dakar. In : Godard, X. (dir.), *Les transports et la ville en Afrique au sud du Sahara*, Karthala-Inrets, Paris-Arcueil, pp. 331–342.
- Sakho, P., 2014. La production de la ville au Sénégal : entre mobilités urbaines, migrations internes et internationales. Vol. 1. Rapport de synthèse. Thèse de doctorat d'Etat sur travaux. Univ. Cheikh Anta Diop de Dakar, Faculté des Lettres et Sciences Humaines, Département de Géographie.
- Sitrass-Curem, 2016. Enquête sur la mobilité, le transport et l'accès aux services urbains dans l'agglomération de Dakar. Rapport d'Analyse final, pour le compte du CETUD. Dakar : CETUD.
- Suman, H. K., Bolia, N. B., Tiwari, G., 2017. Comparing public bus transport service attributes in Delhi and Mumbai: Policy implications for improving bus services in Delhi. *Transport Policy*, 56, 63–74.
- Syscom International, 2001. Enquête sur la mobilité, le transport et les services urbains à Dakar (EMTSU) 2000. Rapport d'analyse pour le CETUD. Dakar : CETUD.
- Tillous, M., 2017. Des voitures de métro pour les femmes. De Tokyo à São Paulo, enjeux et controverses d'un espace réservé. *Les Annales de la recherche urbaine*, 112, 86-95
- Turner, J. 2012. Urban mass transit, gender planning protocols and social sustainability – The case of Jakarta. *Research in Transportation Economics*, 34(1), 48–53.
- Uteng, T.P., 2011. Gender and mobility in the developing world. Background paper for the World Development Report 2012. Washington: The World Bank.
- Vanier, C., d'Arbois de Jubainville, H., 2018. Le sentiment d'insécurité dans les transports en commun : Situations anxiogènes et stratégies d'évitement. *Grand Angle*, n°46, Observatoire National de la Délinquance et des Réponses Pénales, 27 p.]
- Viswanath, K., Mehrotra, S.T., 2007. "Shall we go out?" Women's safety in public spaces in Delhi. *Economic and Political Weekly*, 28 April 2007, 1542–1548.
- World Bank, 2011. Making transport work for women and men: Challenges and opportunities in the Middle East and North Africa. Washington: The World Bank.
- Yavuz, N., Welch, E.W., 2010. Addressing fear of crime in public space: Gender differences in reaction to safety measures in train transit. *Urban Studies*, 47(12), 2491–2515.
- Zhang, W., 2016. Does compact land use trigger a rise in crime and a fall in ridership? A role for crime in the land use-travel connection. *Urban Studies*, 53(14), 3007–3026.