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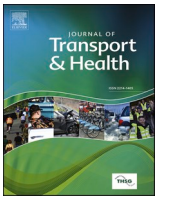

What makes female commuters 'unhappy'? Harassment, fear of crime, and unsought travel behavioral adaptations in public transport against life satisfaction

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ABSTRACT

Introduction: While promoting public transport is undoubtedly essential to meet current sustainability goals, numerous challenges persist among daily travelers, either remaining active or receiving limited attention. A prime example is the exposure to sexual harassment, fear, and forced travel behavioral adaptations primarily affecting women, especially daily commuters constantly exposed to these issues. Moreover, the extent to which it affects their life satisfaction remains somewhat unaddressed in the literature.

Aim: The core aim of this study was to assess the influence of sexual harassment experiences, fear of crime, and unwanted travel behavior adaptations on the life satisfaction of female commuters using public transport.

Methods: This cross-sectional study used the data provided by 720 public transport commuting women in Spanish cities, aged $M = 29$ years, spending about $M = 74$ min a day commuting. Participants responded to an electronic questionnaire addressing everyday traveling issues.

Results: The relationships among experiences of sexual harassment, fear of crime, and responsive patterns of travel behavioral change were consistently positive and significant. Moreover, behavioral adaptations were more prevalent (although not exclusively) among women 'in touch' with sexual harassment on the move. Furthermore, structural analyses suggest that life satisfaction rates are impaired to a great extent by harassment experiences and fear of non-sexual crime but through the full statistical mediation of the often inconvenient, undesired travel adaptations made by commuting women.

Conclusion: These outcomes support the idea that the overall life satisfaction of female daily public transport travelers may be significantly affected by negative commuting experiences and inconvenient responsive behavioral demands. At a practical level, the current study provides valuable insights into the still challenging dynamics involving sexual harassment, fear, and commuting constraints in women. On this basis, conducting contextually aware crime and fear-facing actions might help to improve their travel experiences, overall quality of life, and access to opportunities.

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1. Introduction

Promoting public transport in European cities is now recognized as the safest, most efficient, and environmentally friendly means to achieve sustainable mass mobility in the medium and long term (Christidis et al., 2022; Okraszewska et al., 2022). Indeed, it constitutes a practical cornerstone supporting the objective of "making cities and human settlements inclusive, safe, resilient, and sustainable' (Goal Eleven) in the United Nations' 2030 Sustainable Development Goals agenda (Mahadevia et al., 2023; Racioppi et al., 2020).

However, even though the "what' seems clear enough, there are both typical and emerging user-related constraints that remain unaddressed, along with their associated non-negligible negative outcomes. In other words, it appears that some problems cannot be solely alleviated by making transport systems more sustainable (referred to as "sustainabilizing"), but rather involve broader societal issues that are still challenging to consolidate. Indeed, several authors claim that ensuring the sustainability of transport systems implies tackling broader issues such as gender equity (Pani et al., 2023), economic, social, and environmental aspects (Racioppi et al., 2020); safe urban environments (which include ensuring safety from both the crash- and crime-prevention approaches; García et al., 2022); user-friendly infrastructures (Cendales et al., 2023; Nguyen-Phuoc et al., 2021); and fostering more supportive and cohesive communities (Christidis et al., 2022; Liu et al., 2023; Summers et al., 2020).

Interestingly, given that both concepts imply the need for advances in similar areas, a growing interest in sustainability may help respond to other traditionally neglected or underacknowledged challenges, such as the high prevalence of sexual victimization and fear in transport environments, which continues to impact women on a daily basis around the world (Ceccato and Loukaitou-Sideris, 2022; Vanderschuren et al., 2023).

1.1. Fear of crime and fear of sexual crime: similar but different

The concept of Fear of Crime (FoC) is a multidimensional construct covering both emotional and cognitive dimensions, reflecting perceptions and concerns about the estimation of being criminally victimized. In addition, it has been claimed to influence individuals' behavioral outcomes, especially in negative and inconvenient ways such as travel avoidance, hypervigilance, and substantial involuntary travel modifications (Ceccato et al., 2021; Ison et al., 2023; Riordan, 1999). Although fear of crime has several determinants and correlates, some appear to be pervasive throughout the literature, particularly in relation to crime, risk, and vulnerability-based factors. Regrettably, its consequences include gaps in various spheres, particularly concerning social, gender, and access to opportunity equity (Spicer and Song, 2017; Uteng and Turner, 2019).

Based on empirical evidence, past studies indicate that the prevalence of fear of crime in public transport settings, such as vehicles, stations, and other facilities, is both widespread and often goes unreported. This phenomenon is potentially observed during various times, including service and off-service hours, as highlighted in studies by Alonso et al. (2020) and Useche et al. (2024). Additionally, there are concerns raised by other research about the potential impact of increasing fear of crime rates on the effectiveness, adoption, and satisfaction with public transport services, as indicated in recent studies such as Cozens et al. (2004), Quinones (2020), and Weinstein Agrawal et al. (2020).

At the social level, it has been systematically noted over the last decade that these rates may affect the coverage, social inclusivity, and access to opportunities for vulnerable populations (Macassa et al., 2023; Milani and Carbajal, 2023). Indeed, a significant contributor to this equity-endangering scenario is the undeniable reality that travel behavior patterns are frequently constrained by various factors, including transport accessibility, safety, and security barriers (Marteache et al., 2015; Soto et al., 2022), which tend to expose vulnerable populations to even greater risks, and in most cases remain pending to be holistically considered at transport planning and policymaking scenarios (Ceccato et al., 2021, 2023).

1.2. The 'genderization' of fear of crime in transport

Although both crime and fear of crime dynamics may potentially affect every possible segment of the population, not all of them are put at an equal risk level. While it is widely known that income and neighborhood-based disparities are closely linked to both actual crime rates and fear of crime, there are determinants that significantly explain key differences in terms of perception, impact, and dynamics of crime in transport environments across all income and welfare levels (Boldis et al., 2018; Hernández and Rossel, 2022; Macassa et al., 2023). All in sum, the existing literature supports the idea that the most important of these determinants is gender, especially if referring to fear of (specifically) sexual crime.

Most available literature, both traditional and contemporary sources, propose the classification of 'Fear of Sexual Crime' as a distinct category within the broader concept of Fear of Crime, which can be elicited by other commonly perceived risks in public transport scenarios. This distinction is supported by both 'classic' works on fear of crime like Ferraro (1995) and recent studies such as Uzzaman et al. (2021). From a functional approach, this categorization is justified by the evident differences in dynamics and outcomes commonly observed among male, female, and non-binary travelers concerning personal safety and experiences of sexual aggression in both miscellaneous public spaces and transport facilities and vehicles, as discussed in studies by Devís-Devís et al. (2022), Flores et al. (2022), Herek et al. (2002), and Ison et al. (2023).

Moreover, both empirical studies and comprehensive literature reviews indicate that, in part due to an increasing societal tolerance and a sense of 'normalization,' sexual crimes, especially harassment against women, continue to escalate (Ceccato et al., 2022; Östergren et al., 2022). This trend might further intensify in the wake of the anticipated increase in public transport trips resulting from

the ongoing efforts to make cities more sustainable in the coming years, as argued in previous empirical experiences such as Rayment-McHugh (2023), Spicer and Song (2017), and Useche et al. (2024). Additionally, a significant and noteworthy factor is the rising number and proportion of female workers in previously male-dominated economies, as emphasized in research by Casado-Díaz et al. (2023), the Economic Commission for Latin America and the Caribbean (Women's Autonomy in Changing Economic Scenarios), and Spiliopoulou and Witcomb (2023).

1.3. Public transport, crime, and women's welfare in Spain: key figures

In the case of Spanish cities, it is estimated that about 60% of sexual harassment victims are women, even though statistical underreporting and social tolerance remain key challenges to overcome in the next few years (European Investment Bank, 2023; Pineda et al., 2023). It is worth mentioning that, although this study does not cover their case, this phenomenon is widely prevalent among female transport workers (e.g., vehicle drivers, train conductors, and facility operators) in countries like Spain and the United Kingdom, among which one-half reports having been sexually harassed during their last year of active service (Pillinger, 2017; Veselinovic, 2023).

Furthermore, while experiences of sexual violence and harassment on public transport are more frequently targeted at female travelers, eliciting more fear and alertness among them, their prevalence is widespread, being ominously common in both low- and high-income countries (Rayment-McHugh, 2023; Sardinha et al., 2022). Nonetheless, there is considerably more evidence on the effectiveness of measures, policymaking, and social awareness among the latter, making high-income regions more prone to develop and implement actions to prevent it (Ceccato et al., 2013; Cozens et al., 2004; Lorenc et al., 2013). However, to date, no system has been demonstrated to be 'safe enough' for all users, perpetuating unresolved challenges and gaps such as the still concerning harassment-victimization rates of female travelers.

Among their documented consequences, sexual harassment experiences in and outside the sphere of transport encompass a series of negative mental health outcomes. These include heightened levels of anxiety and depressive symptoms, as evidenced in the study by Östergren et al. (2022). Moreover, such experiences have been linked to diminished perceptions of safety, as discussed by Ceccato and Loukaitou-Sideris (2022), increased trends in substance abuse, as indicated by Reed et al. (2019), and a state of hypervigilance, as explored by Ferrer-Perez et al. (2021) and Ison et al. (2023). However, there is a limited amount of documentation concerning the medium- and long-term effects of harassment in public transport on the life satisfaction outcomes of female commuters.

1.4. Study aim and hypotheses

The core aim of this study was to assess the impact of sexual harassment experiences, fear of crime, and unsought travel behavior adaptations on life satisfaction among female commuters traveling by public transport. Moreover, considering the previous insights added by empirical literature, this study was performed in consideration of two hypotheses.

Hypothesis 1. There are significant associations among sexual harassment experiences, fear of crime, behavioral adaptations, and the self-rated life satisfaction indexes of public transport commuters. However, these could impact differently travel behavior of women with sexual harassment experiences more than those without.

Table 1
Sociodemographic information and features associated with the commuting journeys of the study participants.

Feature	Variable value	Frequency/number (n)	Valid percentage (%)
Age interval	Up to 25 years old	427	59.3%
	26–50 years old	225	31.3%
	Over 50 years old	68	9.4%
Educational attainment	Primary Education or Lower	25	3.5%
	Secondary or High School	169	23.5%
	Technical Education	67	9.3%
	University Education	389	54.0%
	Postgraduate Studies	70	9.7%
Current commuting motive	Student commuter	430	44.9%
	Self-employed commuter	23	3.2%
	Employed commuter	207	37.3%
	Other commuting purpose (e.g., caregiving, volunteering)	60	8.3%
Current commuting motive	Urban bus commuter	392	54.4%
	Railed commuter (i.e., metro or tram)	296	41.1%
	Other (intermodal traveler)	32	4.4%
Average time spent commuting each day (including the journey to and from the destination)	<1 h	231	32.1%
	1–1.9 h	234	32.5%
	2–2.9 h	100	13.9%
	3–3.9 h	17	2.3%
	>4 h	19	2.6%
	Does not respond/remember	119	16.5%

Hypothesis 2. Both sexual harassment experiences and fear of crime in public transport lead to unsought behavioral changes affecting female commuters' life satisfaction. In addition, the magnitude of their statistical contributions may vary, and women forced to conduct more behavioral modifications as a response to fear of crime will report lower life satisfaction rates.

In regard to the unique academic contribution of this study, it is worth mentioning that, to the best of our knowledge, this research assesses for the first time the relationships between victimization events in public transport environments and life satisfaction outcomes among female commuters.

2. Methods

2.1. Participants

In this cross-sectional study, information was collected from a national sample consisting of $n = 720$ female daily urban commuters across the 17 Autonomous Communities of Spain. The average age of the participants was $\mu = 28.94$ years, with a standard deviation of $\sigma = 12.29$ years. The mean daily commuting time was $\mu = 73.82$ min, with a standard deviation of $\sigma = 49.45$ min. Further demographic information about the female commuters participating in the study and their main travel modes is provided in Table 1.

As for the representativeness of the study sample (which was pseudo-probabilistic), it is worth mentioning that while it does not fully reflect all demographic features of the female population of Spain, there are some key similarities. Although there is no specific demographic database for commuters, available national census data, last updated in 2022 (INE, 2024), shows that approximately 32% of adult females in Spain have completed secondary studies, and 44.7% have completed university studies as their highest educational attainment, compared to 23.5% and 54% of our participants, respectively.

In terms of age, it is worth acknowledging that although the study sample covers a wide range of age groups with sufficient cases per segment, the mean age of the female population in Spain is approximately 44 years, considerably higher than ours, even though the mean age of commuters could be assumed to be lower than the raw population figure. Nevertheless, this age difference should be considered when interpreting and making inferences based on the data provided by the study sample.

2.2. Procedure

For this study, data were collected through the application of an electronic survey, which was completed by a nationwide sample of female urban commuters in Spain. The inclusion criteria specified that participants must regularly engage in urban commuting roundtrips multiple times a week using mass public transport.

The recruitment of participants followed a convenience (pseudo-probabilistic) sampling approach, facilitated through a pre-existing mailing list shared among various research groups and academic centers in Spain. This list encompasses individuals who have consented to share their data for research purposes among a network of approximately 20 collaborating institutions spanning universities, research centers/groups, and research-related stakeholders across various regions of the country. As one key advantage, it offers detailed demographic classifications and extends invitations for collaboration in further research experiences. In practical terms and besides the aforementioned, the choice of an electronic survey was motivated by these procedural considerations, including the challenges and reservations associated with conducting face-to-face interviews in a public transport setting.

Throughout the recruitment process, conducted over a period of 5 months, potential participants received a link containing a detailed description of the survey, the study objectives, and ethical information. Indeed, an informed consent form, highlighting current data treatment and protection policies, accompanied this information. In case of agreeing to partake, and before proceeding to start the questionnaire, all participants expressed their agreement to the consent form. They were also explicitly informed that the collected data would be solely used for research and scientific tasks.

The study achieved a response rate of 39.8%, with 720 urban female travelers successfully completing and submitting the electronic form out of the total electronic invitations extended to potential female participants in the research databases.

2.3. Description of the research questionnaire

The data collection instrument employed in this study, an electronic research questionnaire, comprised four primary sections outlined as follows:

The initial section, which was rather generic, focused on demographic and travel-related information of female commuters. It sought details on fundamental social and individual aspects, encompassing gender (research filter), age (whole number), city of commuting (chain variable), educational background (ordinal factor), current occupation (chain variable), and key commuting details such as reasons for daily commuting (categorical; education, work, others) transport mode(s), frequency, trip distance, and daily commuting trip length (measured in the form of average minutes spent in each commuting trip).

Secondly, it was raised a series of questions aimed at evaluating whether they have been exposed to sexual harassment events across various scenarios within the public transport environment. These scenarios encompassed transport stops, stations, the walk to/from a station, and onboard a vehicle. The study partakers were questioned about the frequency of both witnessing (4 items) and experiencing (4 items) sexual harassment in these settings over the past year.

Fear of crime was quantified probabilistically through a comprehensive integrated choice list featuring various crime-related scenarios commonly present within the public transport environment. Their perceived proneness of experiencing such situations

was measured utilizing a 5-point stated choice-based scale [0 = not likely at all; 4 = very likely]. As for the question type used, respondents were presented with a generic statement ("*In the last* 12 months*, to what extent have you felt likely to suffer/experience the next situations while commuting by public transport?*"). There were presented 12 × 2 hypothetical choice situations (12 scenarios during both the day and night), with half related to general offenses (e.g., robbery, aggression) and half to sexual offenses (e.g., undesired exhibitions, verbal harassment/catcalling, physical harassment/touches). To prevent item endogeneity, fear of crime items encompassed all general questions from the scale, excluding those specifically associated with sexual offenses (i.e., fear of sexual crime).

Travel behavioral adaptations comprised a set of five theory-based commuting behavioral modifications chosen on the basis of previous papers commonly observing them in response to experiences or perceptions of crime (see Ceccato and Loukaitou-Sideris, 2022; Orozco-Fontalvo et al., 2019; Soto et al., 2022). The measurement method was dichotomic ("*In the last* 12 months*, have you made any of the following behavioral changes in response to fear of crime or as a result of experiencing a crime?* Yes/No"). These adaptations were aligned with mass public transport settings and included: intentionally changing transport mode(s); avoiding solo travel; steering clear of crowded vehicles; avoiding empty public transport vehicles; and altering travel schedules or time-related routines. To ensure temporal consistency across all measured items, the standard timeframe referred to by all perceptual, victimization-related, and behavioral questionnaire items was the last year – 12 months.

Lastly, life satisfaction was assessed using Diener's Satisfaction with Life Scale (Diener et al., 1985), consisting of 5 subjective quality-of-life-related statements. This scale is among the most widely utilized psychological inventories for measuring life satisfaction, with numerous previous applications within the general population.

2.4. Ethical approvals

To conduct this study, approval and evaluation were sought from two bodies. Initially, the research protocol underwent scrutiny and received approval from a Research Ethics Committee (INTRAS-UV). The ethical application aimed to assess the protocol's adherence to the essential ethical principles outlined in the Declaration of Helsinki, a crucial requirement for research involving human subjects (Institutional Review Board approval number HE0002140923). Additionally, the Research Committee on Equity, Inclusion, and Gender issues at the INTRAS-UV evaluated and endorsed the gender, diversity, and inclusiveness aspects of the research (Institutional Review Board grant EIG0001031023).

2.5. Data analysis

After conducting the data curation (i.e., labeling, coding, and reviewing the information provided by respondents), some basic statistical procedures were carried out. Namely, the scale results were calculated based on the scoring criteria of each instrument. Specifically, the items of the Satisfaction with Life Scale were averaged to create an unifactorial life satisfaction score. Fear of crime question responses, as well as fear of sexual crime items, were respectively averaged to calculate two continuous variables (i.e., fear of non-sexual crime, and fear of sexual crime). The variable "behavioral adaptations" was quantified as the sum of the scores of all items/situations composing the questionnaire, which used a dichotomous response scale, and averaged for quantitative analyses. Following this, internal reliability, and fundamental descriptive analyses (including means, standard deviations, and bivariate correlations) were carried out. All the scales used had Cronbach Alpha $\alpha > 0.825$ and McDonald's Omega values $\omega > 0.834$, thus meeting the minimum criteria of $\alpha/\omega \geq 0.700$ commonly used in specialized literature for internal consistency (Dunn et al., 2014; Stensen and Lydersen, 2022).

Once the necessary basic parameters were assessed, the partial correlation (with statistical controls for age and educational attainment) and comparative tests necessary for assessing Hypothesis 1 were conducted. Considering that commuter subgroups were not uniformly sized based on their previously reported sexual harassment experiences, various robust categorical comparative tests (i.e., Phi – φ, Gamma – γ, and Chi-Squared – χ^2) were conducted. The aim was to determine the correlation between sexual harassment experiences, fear of crime and the manifestation of involuntary behavioral adaptations (all of them used as ordinal variables). Additionally, these categorical differences were graphically compared using self-reported frequencies provided for each possible travel behavioral adaptation.

Subsequently, and in order to test Hypothesis 2 (which was directional and required a confirmatory theory-based procedure), Structural Equation Modeling (SEM) analyses were conducted. These analyses included statistical controls for age, educational attainment, trip length, and city size. The objective was to examine the relationships among sexual harassment experiences, fear of non-sexual crime, and behavioral adaptations concerning life satisfaction rates. The study also explored the potential mediating role of these undesired travel behavioral changes, if present. The SEM analyses were bootstrapped using Montecarlo parametric tests with 2000 bootstrap iterations, and confidence intervals were set at a level of 95%. All statistical analyses were carried out using IBM SPSS, v.28, except for structural equation modeling analyses, which required IBM SPSS AMOS v.28 software.

3. Results

3.1. Correlation analysis

To assess the possible associations between sexual harassment experiences and other study variables, a set of parametric correlations was conducted. Given that these two variables represent common confounding factors potentially impairing their interpretability, the correlations were set up controlling for commuters' age and educational attainment.

Among the most relevant bivariate associations found, some significant links stand out between sexual harassment experiences in public transport environments and: fear of (non-sexual) crime ($r = 0.298$; $p < 0.001$); the number of unsought travel behavioral adaptations performed in the last year ($r = 0.237$; $p < 0.001$); and the self-reported life satisfaction of female commuters ($r = -0.098$; $p < 0.050$).

As for other relevant associations found, it is worth pointing out a set of negative correlations between commuters' life satisfaction and: their common trip length ($r = -0.168$; $p < 0.001$); and the number of travel behavioral adaptations they had to conduct in the last 12 months ($r = -0.104$; $p < 0.010$). The full set of the study's bivariate correlations is available in Table 2.

3.2. Comparative analysis

Secondly, with the aim of assessing the differences in terms of travel behavioral adaptations among women having (and having not) experienced sexual harassment-related events over the last year, a set of comparative tests was carried out. While *a total of* 133 (19%) female commuters reported no instances of witnessing or experiencing sexual harassment in public transport scenarios, a greater number of them (587, representing 81% of the sample), self-reported at least one victimization suffered or by-standing event of this nature.

Once the two groups were split and, considering that the motive(s) for such travel behavioral adaptations could correspond (or not) to the impact of sexual harassment experiences, the relative frequencies of each one of them (i.e., Group 1 versus Group 2) were comparatively analyzed through various robust ordinal (i.e., Phi, Gamma, and Chi-squared) tests advised for categorically distributed conglomerates. The results of these analyses are fully available in Table 3.

Overall, the most frequently reported travel behavioral adaptation was to avoid traveling alone ($\gamma = 0.205$, $p < 0.050$), as conducted by 49.3% of women who had experienced/witnessed sexual harassment events, compared to 39.1% reporting a negative outcome in this regard. This was followed by avoiding empty public transport vehicles ($\gamma = 0.333$, $p < 0.001$), conducted by 42.6% of respondents with sexual harassment experiences compared to 27.1% of those not having them, and changing their travel schedules ($\gamma = 0.386$, $p < 0.001$), which was significantly more prevalent among women who reported a positive response regarding sexual harassment experiences with 29.8%, in contrast to the 15.7% reported by their counterparts.

On the other hand, while they were also higher in frequency among commuters with sexual harassment experiences, the adaptations consisting of changing travel means and avoiding crowded public transport vehicles had non-significant differences between the groups. Fig. 1 graphically shows the whole set of frequencies and differences found in this regard.

3.3. SEM analysis

To test the directional hypothesis regarding the impact of the exogenous variables (i.e., sexual harassment experiences and fear of crime in public transport environments) on travel behavioral adaptations and life satisfaction indexes, and bearing in mind the confirmatory nature of the procedure, a theory-based Structural Equation Model was drawn. The model controlled for key confounding variables such as women's age, educational attainment, trip length, and city sizes. For this purpose, there were developed three consecutive modeling steps.

In the first step, statistical controls were integrated, and the model was structured to evaluate the possible direct (non-mediated) effects of sexual harassment experiences and fear of crime on life satisfaction. In the second step, three new paths (i.e., sexual harassment → behavioral adaptations; fear of crime → behavioral adaptations; behavioral adaptations → life satisfaction) were included to examine the potential mediating effect of behavioral adaptations between sexual harassment experiences, fear of crime, and overall commuters' life satisfaction rates. In the third step, and as mentioned in the data analysis section, statistical adjustments, particularly bootstrapping procedures, were applied to address and correct potential biases, thus minimizing type I errors in path significance (Andrews and Buchinsky, 2000; Lijarcio et al., 2022).

Table 2
Partial bivariate correlations among the study variables.

Study Variable		Item	1	2	3	4	5
1	Commuting Trip Length (min.)	Correlation	–				
		Sig. (2-tailed)					
2	City/Town Population Density	Correlation	−0.005	–			
		Sig. (2-tailed)	0.895				
3	Sexual Harassment Experiences	Correlation	−0.006	0.016	–		
		Sig. (2-tailed)	0.870	0.662			
4	Fear of Crime	Correlation	0.014	0.060	0.298[b]	–	
		Sig. (2-tailed)	0.713	0.109	<0.001		
5	Travel Behavioral Adaptations	Correlation	0.010	0.094[a]	0.237**	0.197**	–
		Sig. (2-tailed)	0.788	0.012	<0.001	<0.001	
6	Life Satisfaction	Correlation	−0.168[b]	−0.068	−0.098[a]	−0.062	−0.104[b]
		Sig. (2-tailed)	<0.001	0.070	0.011	0.094	0.006

Notes for the table: Controlling for age and educational attainment.
[a] Correlation is significant at the .050 level (2-tailed).
[b] Correlation is significant at the .010 level (2-tailed).

Table 3
Unsought travel behavioral adaptations performed by female commuters having (or not) experienced sexual harassment events in public transport environments during the last year.

Travel Behavioral Adaptation	Sexual Harassment Experiences[a]				Ordinal tests					
	Group 1 (With)		Group 2 (Without)		Phi[b]		Gamma[c]		Chi-square[d]	
	Yes	No	Yes	No	φ	Sig.	γ	Sig.	χ^2	Sig.
Changing travel mode(s)	38.8%	61.2%	33.1%	66.9%	0.046	0.224	0.123	0.214	1.481	0.224
Avoiding traveling alone	49.3%	50.7%	39.1%	60.9%	0.079	*	0.205	*	4.521	*
Avoiding crowded transport	21.1%	78.9%	15.8%	84.2%	0.052	0.168	0.176	0.140	1.903	0.168
Avoiding empty transport	42.6%	57.4%	27.1%	72.9%	0.123	***	0.333	***	10.844	***
Changing travel schedules	29.8%	70.2%	15.8%	84.2%	0.122	***	0.386	***	10.667	***

Notes for the table.
[a] Women having (or not) experienced sexual harassment experiences in public transport whether as a victim o by-stander (Time span: last 12 months).
[b] Contingency (Phi) Coefficient.
[c] Goodman & Kruskal's Gamma coefficient.
[d] Pearson's Chi-squared tests.

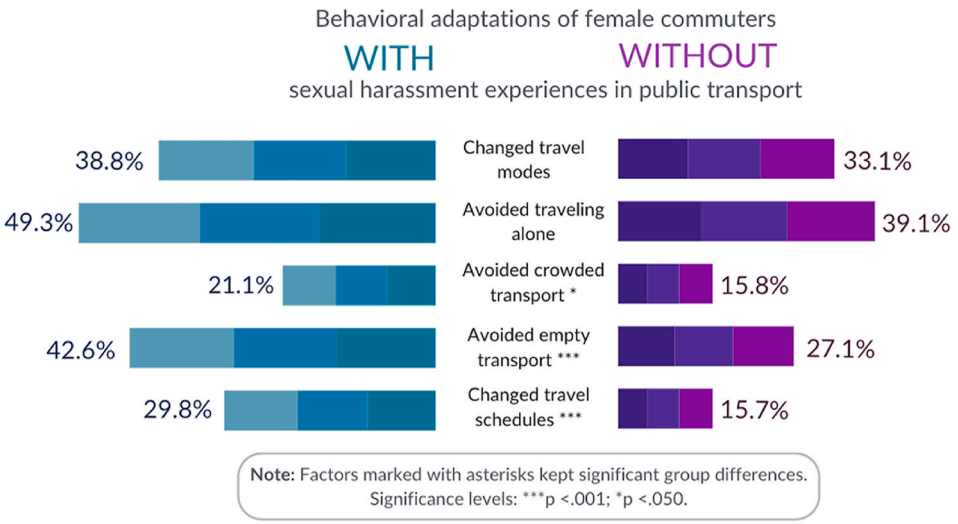

Fig. 1. Differences in the performance of unsought travel behavioral adaptations among female commuters who have (Group 1 – left) and have not experienced (Group 2 – right) sexual harassment events in public transport environments during the last 12 months.

The goodness-of-fit statistics for the retained model were $\chi^2 = 7.264$, $p < 0.001$; NFI = 0.974; CFI = 0.979; IFI = 0.981; RMSEA = 0.061–90% CI [0.018 - 0.110]. Given its theoretical parsimony and satisfactory fit indices, the model was deemed suitable and retained. Details of the SEM model, including standardized and bootstrap bias-corrected parameter estimates, are provided in Table 4 and visually represented in Fig. 2. Solid (continuous) lines or arrows in the figure indicate significant predictive relationships between study variables.

In structural terms, the graphical path model presented in Fig. 2 shows three **direct and significant effects** on life satisfaction out of the seven drawn paths, two of which correspond to statistical controls. In other words, the only exogenous variable exerting a significant effect on life satisfaction was the number of unsought behavioral adaptations performed ($\beta = -0.101$; $p < 0.010$). As for controlling variables, both commuters' age ($\beta = -0.104$; $p < 0.010$) and average trip length ($\beta = -0.145$; $p < 0.010$) were negatively associated with life satisfaction outcomes.

Concerning the paths examining the predictive connection between the frequency of sexual harassment experiences and behavioral adaptations, both demonstrated positive and significant associations. In simpler terms, it indicates that both the occurrences of sexual harassment and the apprehension of non-sexual crimes significantly impact the extent of performed behavioral adaptations. Nevertheless, the significant effect of sexual harassment-related experiences had a slightly higher magnitude than the self-reported fear of other types of crime ($\beta D_{A\text{-}B} = 0.021$) as a predictor of unsought behavioral adaptations.

Moreover, regarding structural indirect effects (i.e., chain-based statistical links among variables), behavioral adaptations constituted a full statistical mediator between both the sexual harassment experiences in public transport ($\beta = 0.160$; $p < 0.010$) and fear of non-sexual crime ($\beta = 0.139$; $p < 0.010$) and life satisfaction rates. In other words, this outcome suggests that life satisfaction rates are not directly affected by suffering, by-standing, or fearing sexual or non-sexual victimizations but by the effect of having to

Table 4
Variables included in the model, estimates, significance levels, and 95% confidence intervals for bootstrap bias-corrected values of the path model.

Structural path			SPC[a]	S.E.[b]	C.R.[c]	p[d]	Bootstrap bias-corrected values[e]				
							Est[f]	Bias[g]	95% CI[h]		p[d]
Direct effects											
Sexual Harassment Experiences	→	Behavioral Adaptations	0.160	0.010	4.063	***	0.160	0.000	0.078	0.250	**
	→	Life Satisfaction	−0.034	0.045	−0.769	0.442	−0.031	0.003	−0.108	−0.049	0.380
Fear of Non-Sexual Crime	→	Behavioral Adaptations	0.141	0.009	3.613	***	0.139	−0.002	0.056	0.221	**
	→	Life Satisfaction	−0.047	0.042	−1.281	0.200	−0.050	−0.003	−0.123	0.023	0.198
Mediated effect											
Behavioral Adaptations	→	Life satisfaction	−0.101	0.163	−2.703	**	−0.101	0.000	−0.166	−0.024	**
Statistical controls											
Age	→	Behavioral	−0.026	0.001	−0.687	0.492	−0.026	0.000	−0.107	0.062	0.514
Education	→	Adaptations	−0.001	0.010	−0.152	0.880	−0.005	−0.004	−0.083	0.068	0.745
Trip Length	→		0.014	0.001	0.432	0.667	0.016	0.002	−0.045	0.088	0.622
City Size	→		0.080	0.006	2.285	*	0.083	0.003	0.018	0.159	*
Age	→	Life satisfaction	−0.102	0.004	−2.741	**	−0.104	0.002	−0.185	−0.029	**
Education	→		0.053	0.042	1.361	0.173	0.050	−0.003	−0.020	0.125	0.195
Trip Length	→		−0.144	0.002	−3.973	***	−0.145	0.001	−0.217	−0.070	**
City Size	→		−0.041	0.027	−1.168	0.243	−0.043	0.002	−0.120	0.037	0.324

Notes.
[a] SPC= Standardized Path Coefficients (can be interpreted as Beta-linear regression weights).
[b] S.E. = Standard Error.
[c] CR= Critical Ratio.
[d] p-value: *significant at the level $p < .050$; **significant at the level $p < .010$; ***significant at the level $p < .001$.
[e] Bootstrapped (bias-corrected) model.
[f] Bootstrapped (bias-corrected) model standardized estimates.
[g] Bias identified (and corrected) in the path.
[h] Confidence Interval at the level 95% (lower bound – left; upper bound – right).

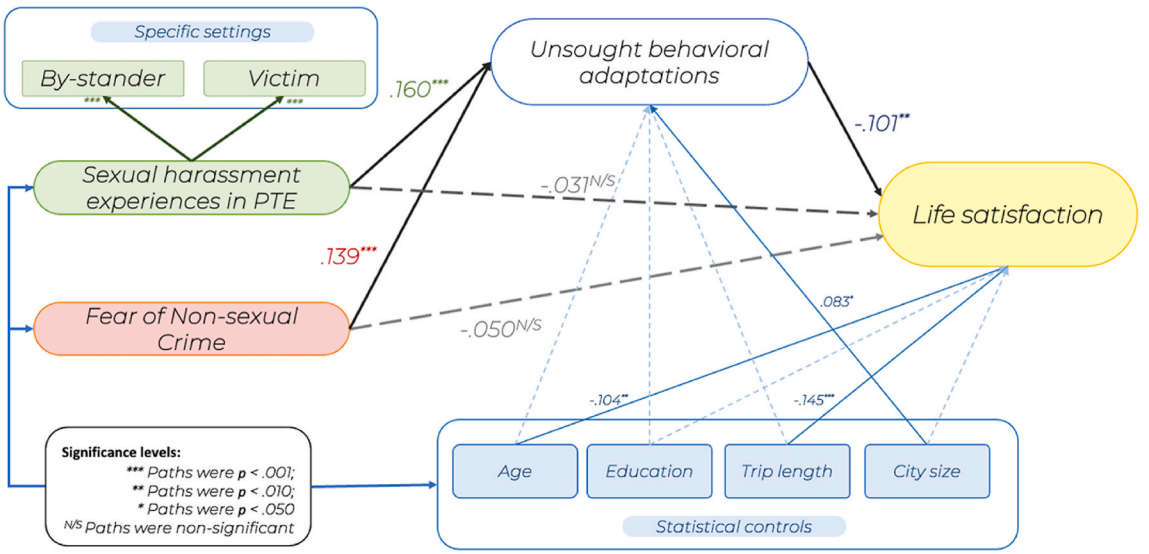

Fig. 2. Significant path model - Bootstrap (bias-corrected) parameter estimates. Rectangles represent non-latent (observed) factors, while ellipses signify latent variables. Statistically significant estimates, as highlighted in Table 4, are denoted by solid lines.

perform undesired behavioral adaptations affecting female commuters' daily transport patterns.

4. Discussion

Thanks to several research efforts made during the last two decades, key issues such as the impairing role of sexual harassment in transport on different life spheres have been gaining ground in the literature (Ceccato and Loukaitou-Sideris, 2022; Useche et al., 2024). It is evident that, in the mid- and long-term, these issues also hinder women's access to social and economic opportunities,

thereby affecting their overall well-being (King et al., 2021, 2023). Therefore, this study aimed to assess the impact of sexual harassment experiences, fear of (non-sexual) crime, and unsought travel behavior adaptations on life satisfaction (a widely used quality of life outcome) among an extensive sample of female commuters traveling by public transport.

Overall, the results of this study support the idea that there are significant and coherent associations among commuting patterns, travel-related sexual harassment experiences, and behavioral adaptations (Hypothesis 1), as previously suggested in studies separately addressing these issues, such as Gareau and Phillips (2022), Rodas-Zuleta et al. (2022), and Wang et al. (2022). However, further aspects such as life satisfaction despite potentially being underrepresented in travel behavioral literature, could be systematically affected by these threatening issues (Hypothesis 2). Therefore, this discussion will systematically address these two aspects to interpret the current results in the context of the existing accumulated literature.

4.1. Factors associated with fear of crime and sexual harassment in public transport

The first hypothesis of this study posited that significant correlations might exist between the life satisfaction rates of female commuters and security-related issues in public transport, including both experiences of sexual harassment and fear of (non-sexual) crime. While the obtained correlations do not indicate directional effects of sexual harassment on travel behavioral adaptations or life satisfaction outcomes, it seems plausible, considering that these relationships remain inverse and significant even after controlling for commuters' age, educational attainment, trip length, and population density. In other words, the results suggest that women who travel longer distances, experience or witness sexual harassment events, and have to adapt their behavior to avoid victimization in the transport environment tend to self-report lower levels of life satisfaction.

Another relevant issue previously emphasized in the existing literature is the importance of the correlation between sexual harassment experiences and the perceived likelihood of female commuters experiencing other types of victimization, specifically, fear of (non-sexual) crime. Previous research conducted in various countries (refer to studies such as Dunckel-Graglia (2013), Nguyen--Phuoc et al. (2021), Orozco-Fontalvo et al. (2019), and Soto et al. (2022) for an illustration) has highlighted the 'overlap' between sexual and non-sexual security-related issues in public transport, indicating that these issues tend to co-vary and impact, albeit differently, the daily movements of female travelers. In the context of this study, the correlation between sexual harassment experiences and fear of (non-sexual) crime was not only positive but also had the highest magnitude (0.298; $p < 0.001$), surpassing even the association between sexual harassment experiences and involuntary travel behavioral adaptations (0.237; $p < 0.001$).

Moreover, it is worth addressing the quantitative differences found regarding the number of self-reported travel adaptations by commuting women who have (or have not) been exposed to sexual harassment events in public transport. While both groups of commuters, i.e., Group 1 (women with sexual harassment experiences) and Group 2 (women without them), self-reported a non-negligible number of adaptations, Group 1 tended to make significantly more adaptations, particularly in avoiding solo travel ($p < 0.050$), avoiding empty public transport scenarios ($p < 0.001$), and deliberately changing their daily travel schedules ($p < 0.001$).

In other words, while it is widely known that females, in general, have constrained travel behavior due to fear of men (Stark and Meschik, 2018), there could be considerable differences based on exposure to sexual harassment events. Additionally, consistent with previous studies, these results support the idea that this specific type of exposure may serve as a significant predictor of involuntary travel modifications among female city commuters (Cedeno and Bohlen, 2023; Useche et al., 2024). However, this assumption implies directionality, reason for which requires further theoretical support and discussion, thus being discussed in the paragraphs below referring to structural equation modeling procedures.

4.2. Could it be something like a 'transport-based' life satisfaction impairment?

From a directional and statistically mediated perspective (second hypothesis), a suitable response to this question may be based on the confirmation of the predictive links separately formulated by studies such as Currie et al. (2013), Ison et al. (2023), Uteng and Turner (2019) in which behavioral adaptations usually correspond to the fear elicited by an increased perceived probability of victimization in public spaces, including public transport scenarios (Alonso et al., 2020; Ceccato et al., 2021, 2023; Ceccato and Loukaitou-Sideris, 2022).

At the outset, the model evaluated the possible direct influence of (*i*) experiencing sexual harassment, (*ii*) fear of (non-sexual) crime, and (*iii*) unsought behavioral adaptations on travel patterns (three theory-based dependent variables) on overall life satisfaction outcomes of female commuters. However, considering that behavioral adaptations are typically assumed in the literature as a consequence of the other two exogenous variables (see Gareau and Phillips, 2022; Soto et al., 2022; Stark and Meschik, 2018; Wang et al., 2022), its effect might be more accurately considered as a statistical mediation between harassment exposure/fear and life satisfaction.

At the statistical level, the model showed a favorable fit and coherent directions, depicting significant associations between exogenous and endogenous variables. Regarding statistical controls, literature-coherent effects were identified. Specifically, age negatively predicted life satisfaction indices, aligning with common findings in the international literature on life satisfaction patterns across life stages (see Su et al., 2022), although there tends to be an ascending U-shaped pattern after the age of 50–55 (see Becker and Trautmann, 2022). Another directionally coherent and significant finding was that commuters having to conduct longer commuting trips in cities of countries considered of High Income (HICs, such as Spain) tend to report lower life satisfaction levels than those in less densely populated areas (Weckroth and Kemppainen, 2021).

Of particular interest, and regarding the 'key insights from the model', the unsought travel behavioral adaptations made in the last year served as a complete statistical mediator between both harassment exposure and fear (independent factors) and life satisfaction

(dependent factor) indices.

In essence, the current structural analysis allows us to suggest that, among various factors related to different spheres, what has the most significant impact on decreasing life satisfaction for female daily public transport commuters may not solely be the exposure to sexual harassment events (whether as a victim or bystander) or the fear of other types of victimization. Instead, the direct key satisfaction impairer might be the necessity to compromise their quality of life through a great number of undesired travel changes, often impacting them in the form of –among many others– economic (e.g., having to pay for a more expensive means), personal (e.g., using family time for longer commutes), social (e.g., depending on others for safe travel), and opportunity access-restricting (e.g., a gradual loss of control over key life choices) impairments suffered in consequence.

5. Limitations of the study and further research

While this study was carried out with a substantial and comprehensive nationwide sample of female commuters, utilizing instruments with demonstrated robust psychometric features and the model had coherent and cohesive relationships among its constructs, it is worth recognizing and briefly putting in context certain inherent limitations.

Initially, consider potential limitations associated with common method biases. The inherent difficulties of cross-sectional designs in establishing causality, coupled with the risk of biases influencing relationships through shared method variance or inflated associations (Conway and Lance, 2010; Podsakoff et al., 2012) deserve careful consideration regardless of theoretical plausibility. To address these constraints, employing complementary longitudinal or multi-method approaches would enhance the robustness of findings; however, this preliminary survey-based study remains confined in its scope.

Secondly, although all predictive assumptions in the study were grounded in theory, the available evidence supporting these assumptions is still somewhat restricted, potentially biasing the nature and directionality of literature-based structural outcomes. Moreover, although our findings collectively suggest that enhancing safe experiences and perceptions in public transport environments has the potential to increase its convenience and sustainability-favoring usage (Alonso et al., 2017; Watkins, 2018), this has not been tested yet from a longitudinal perspective. Instead, it corresponds to a theoretical connection to other studies (see Almanza-Avendaño et al., 2022; Basu et al., 2023; Ibrahim et al., 2023), which remains to be empirically demonstrated.

Moreover, and as for further research, it is important to acknowledge other relevant 'gendered' issues that potentially further enhance behavioral adaptations. For example, females have traditionally been associated with care-related trips, such as taking children to school, or caring for dependent individuals (Chowdhury, 2019; De Castro et al., 2020). This factor may contribute to increasing the travel demands placed on them and further predispose them to adapt their travel patterns. Additionally, it may involve these cared ones in dynamics related to fear and insecurity, prompting responsive adaptations and satisfaction impairments, as implied by studies such as Fong and Shaw (2024) and Garcia et al. (2020). Therefore, exploring care-related factors that significantly impact female commuters' dynamics and outcomes warrants further investigation.

Finally, the main focus of this study was on daily commuting women as a general population segment or traveler concept. However, prior research has indicated that individuals with intersecting vulnerabilities, such as social exclusion, health-related, or age-linked risk markers may experience even more adverse experiences and life outcomes (King et al., 2021 & 2023; Rosembloom, 2007). Even when imbued with increased complexity, exploring this avenue in future research would be particularly valuable in addressing persistently intricate dynamics, underlying factors, and challenges faced by both travelers and transport planners & policymakers.

6. Conclusions

The findings of this study support the notion that there are positive, significant, and consistent correlations among sexual harassment experiences, fear of crime, and forced travel behavioral changes made by female commuters. However, concerning the first study hypothesis, these behavioral impairments seem to affect women with sexual harassment experiences more than those without.

Regarding the second study hypothesis, which involves directionality and statistical mediation, the structural analyses suggest that, rather than the mere exposure to sexual harassment experiences and fearful events, what might directly act as a life satisfaction disruptor for female commuters using public transport could be the number of undesired travel changes and subsequent adaptations that restrict opportunities.

6.1. Practical implications

At a practical level, this study provides valuable insights useful to address the challenging dynamics involving sexual harassment, fear of crime, and commuting habits of female commuters using public transport. Based on its results, it is reasonable to propose some potential further avenues/solutions in various spheres.

First, transport safety and security practitioners might find it valuable to have empirical support on the relationship between travel experiences and extra-transport welfare indicators (e.g., general life satisfaction) of female commuters, emphasizing fear and unwanted changes as relevant issues to address in upcoming interventions.

Secondly, from a policymaking approach, it highlights the need for 'contextually-aware' crime and fear-facing actions that, apart from improving transport security settings, might positively affect their travel experiences, access to transport-related opportunities, and overall quality of life.

Thirdly, from a research standpoint, this study highlights emerging questions and needs worth studying. Good examples include the complex interrelations between harassment and transport justice, as well as the female-linked 'mobility of care' and other gender

disparities that must be further explored to develop deeper contextually-based understandings of the phenomenon.

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CRediT authorship contribution statement

Elisa Alfaro: Writing – review & editing, Visualization, Validation, Software, Resources, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Francisco J. Llamazares:** Investigation, Supervision, Validation, Writing – review & editing, Methodology, Resources. **Sergio A. Useche:** Writing – review & editing, Writing – original draft, Visualization, Validation, Supervision, Software, Resources, Project administration, Methodology, Investigation, Formal analysis, Data curation, Conceptualization.

Declaration of competing 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.

Data availability

Data will be made available on request.

References

Almanza-Avendaño, A.M., Romero-Mendoza, M., Gómez San Luis, A.H., 2022. From harassment to disappearance: young women's feelings of insecurity in public spaces. PLoS One 17 (9), e0272933. https://doi.org/10.1371/journal.pone.0272933.

Alonso, F., Useche, S.A., Faus, M., Esteban, C., 2020. Does urban security modulate transportation choices and travel behavior of citizens? A national study in the Dominican republic. Frontiers in Sustainable Cities 2, 42. https://doi.org/10.3389/frsc.2020.00042.

Alonso, F., Esteban, C., Montoro, L., Useche, S.A., 2017. Knowledge, perceived effectiveness and qualification of traffic rules, police supervision, sanctions and justice. Cogent Social Sciences 3 (1), 1393855. https://doi.org/10.1080/23311886.2017.1393855.

Andrews, D.W.K., Buchinsky, M., 2000. A three-step method for choosing the number of bootstrap repetitions. Econometrica 68 (1), 23–51.

Basu, N., Oviedo-Trespalacios, O., King, M., Kamruzzaman, Md, Haque, Md M., 2023. What do pedestrians consider when choosing a route? The role of safety, security, and attractiveness perceptions and the built environment during day and night walking. Cities 143, 104551. https://doi.org/10.1016/j.cities.2023.104551.

Becker, C.K., Trautmann, S.T., 2022. Does happiness increase in old age? Longitudinal evidence from 20 European countries. J. Happiness Stud. 23 (7), 3625–3654. https://doi.org/10.1007/s10902-022-00569-4.

Boldis, B.V., San Sebastián, M., Gustafsson, P.E., 2018. Unsafe and unequal: a decomposition analysis of income inequalities in fear of crime in northern Sweden. Int. J. Equity Health 17 (1), 110. https://doi.org/10.1186/s12939-018-0823-z.

Casado-Díaz, J.M., Simón-Albert, R., Simón, H., 2023. Gender differences in commuting: new evidence from Spain. Soc. Indicat. Res. 169 (3), 907–941. https://doi.org/10.1007/s11205-023-03183-w.

Ceccato, V., Gaudelet, N., Graf, G., 2022. Crime and safety in transit environments: a systematic review of the English and the French literature, 1970–2020. Public Transport 14 (1), 105–153. https://doi.org/10.1007/s12469-021-00265-1.

Ceccato, V., Langefors, L., Näsman, P., 2023. The impact of fear on young people's mobility. Eur. J. Criminol. 20 (2), 486–506. https://doi.org/10.1177/14773708211013299.

Ceccato, V., Loukaitou-Sideris, A., 2022. Fear of sexual harassment and its impact on safety perceptions in transit environments: a global perspective. Violence Against Women 28 (1), 26–48. https://doi.org/10.1177/1077801221992874.

Ceccato, V., Näsman, P., Langefors, L., 2021. Sexual violence on the move: an assessment of youth's victimization in public transportation. Women Crim. Justice 31 (4), 294–312. https://doi.org/10.1080/08974454.2020.1733732.

Ceccato, V., Uittenbogaard, A., Bamzar, R., 2013. Security in Stockholm's underground stations: the importance of environmental attributes and context. Secur. J. 26 (1), 33–59. https://doi.org/10.1057/sj.2011.32.

Cedeno, R., Bohlen, J., 2023. Sexual Harassment and Prevention Training. StatPearls Publishing. https://www.ncbi.nlm.nih.gov/books/NBK587339/.

Cendales, B., Llamazares, F.J., Useche, S.A., 2023. Are subjective outcomes a "missing link" between driving stress and risky driving behaviors of commuters? Assessing the case of a LMIC. Saf. Sci. 158, 105996 https://doi.org/10.1016/j.ssci.2022.105996.

Christidis, P., Navajas Cawood, E., Fiorello, D., 2022. Challenges for urban transport policy after the Covid-19 pandemic: main findings from a survey in 20 European cities. Transport Pol. 129, 105–116. https://doi.org/10.1016/j.tranpol.2022.10.007.

Chowdhury, S., 2019. Role of gender in the ridership of public transport routes involving transfers. Transport. Res. Rec. 2673 (4), 855–863. https://doi.org/10.1177/0361198119837155.

Conway, J.M., Lance, C.E., 2010. What reviewers should expect from authors regarding common method bias in organizational research. J. Bus. Psychol. 25 (3), 325–334. https://doi.org/10.1007/s10869-010-9181-6.

Cozens, P., Neale, R., Hillier, D., Whitaker, J., 2004. Tackling crime and fear of crime while waiting at britain's railway stations. Journal of Public Transportation 7 (3), 23–41. https://doi.org/10.5038/2375-0901.7.3.2.

Currie, G., Delbosc, A., Mahmoud, S., 2013. Factors influencing young peoples perceptions of personal safety on public transport. Journal of Public Transportation 16 (1), 1–19. https://doi.org/10.5038/2375-0901.16.1.1.

De Castro, G.G., Camargos, A.S., Farias, M.S., 2020. Urban accessibility barriers: daily life of families of children with neurological disabilities. REFACS 8, 694–701. https://doi.org/10.18554/refacs.v8i0.4744.

Devís-Devís, J., Pereira-García, S., Valencia-Peris, A., Vilanova, A., Gil-Quintana, J., 2022. Harassment disparities and risk profile within lesbian, gay, bisexual and transgender Spanish adult population: comparisons by age, gender identity, sexual orientation, and perpetration context. Front. Public Health 10, 1045714. https://doi.org/10.3389/fpubh.2022.1045714.

Diener, E., Emmons, R.A., Larsen, R.J., Griffin, S., 1985. The satisfaction with life scale. J. Pers. Assess. 49 (1), 71–75. https://doi.org/10.1207/s15327752jpa4901_13.
Dunckel-Graglia, A., 2013. Women-only transportation: how "pink" public transportation changes public perception of women's mobility. Journal of Public Transportation 16 (2), 85–105. https://doi.org/10.5038/2375-0901.16.2.5.
Dunn, T.J., Baguley, T., Brunsden, V., 2014. From alpha to omega: a practical solution to the pervasive problem of internal consistency estimation. Br. J. Psychol. 105 (3), 399–412. https://doi.org/10.1111/bjop.12046.
European Investment Bank, 2023. Switching Tracks on Harassment. https://www.eib.org/en/stories/barcelona-transport-sexual-harassment.
Ferraro, K.F., 1995. Fear of crime: interpreting victimization risk. https://api.semanticscholar.org/CorpusID:145273768.
Ferrer-Perez, V.A., Delgado-Alvarez, C., Sánchez-Prada, A., Bosch-Fiol, E., Ferreiro-Basurto, V., 2021. Street sexual harassment: experiences and attitudes among young Spanish people. Int. J. Environ. Res. Publ. Health 18 (19). https://doi.org/10.3390/ijerph181910375.
Flores, A.R., Stotzer, R.L., Meyer, I.H., Langton, L.L., 2022. Hate crimes against LGBT people: national crime victimization survey, 2017-2019. PLoS One 17 (12), e0279363. https://doi.org/10.1371/journal.pone.0279363.
Fong, A.Z., Shaw, F., 2024. Well-being implications of mobility of care: gender differences among U.S. adults. Transport. Res. Transport Environ. 129, 104109 https://doi.org/10.1016/j.trd.2024.104109.
García, I., Albelson, M., Puczkowskyj, N., Maheruma Khan, S., Fagundo-Ojeda, K., 2022. Harassment of low-income women on transit: a photovoice project in Oregon and Utah. Transport. Res. Transport Environ. 112, 103466 https://doi.org/10.1016/j.trd.2022.103466.
García, J.A.G., Castillo, E.D.L.C., Covarrubias, S.N.M.D., Hernández, M.A.G., Granada, I., Glen, C., Crotte, A., 2020. [*Mobility Patterns of Women in the Intermodal Corridor of the Guadalajara Metropolitan Area*]. Inter-American Development Bank, Washington. https://doi.org/10.18235/0002664.
Gareau, E., Phillips, K.P., 2022. Key informant perspectives on sexual health services for travelling young adults: a qualitative study. BMC Health Serv. Res. 22 (1), 145. https://doi.org/10.1186/s12913-022-07542-0.
Herek, G.M., Cogan, J.C., Gillis, J.R., 2002. Victim experiences in hate crimes based on sexual orientation. J. Soc. Issues 58 (2), 319–339. https://doi.org/10.1111/1540-4560.00263.
Hernández, D., Rossel, C., 2022. Gender inequality, transport, and wellbeing: the case of child healthcare in Uruguay. J. Transport Health 26, 101415. https://doi.org/10.1016/j.jth.2022.101415.
Ibrahim, M.N., Logan, D.B., Koppel, S., Fildes, B., 2023. The role of safety in modal choice and shift: a transport expert perspective in the state of Victoria (Australia). PLoS One 18 (4), e0280949. https://doi.org/10.1371/journal.pone.0280949.
Women's Autonomy in Changing Economic Scenarios ECLAC (LC/CRM.14/3).n.d.https://repositorio.cepal.org/server/api/core/bitstreams/b0c2bdb3-e9d9-4816-83c8-3d29539fe2cc/content.
INE, 2024. [Demography and population]. Spanish National Institute of Statistics. Web Resource. Available at: https://www.ine.es/dyngs/INEbase/es/categoria.htm?c=Estadistica_P&cid=1254734710984. (Accessed 14 May 2024).
Ison, J., Forsdike, K., Henry, N., Hooker, L., Taft, A., 2023. "You're just constantly on alert": women and gender-diverse people's experiences of sexual violence on public transport. J. Interpers Violence 38 (21–22), 11617–11641. https://doi.org/10.1177/08862605231186123.
King, J., King, M., Edwards, N., Carroll, J.-A., Watling, H., Anam, M., Bull, M., Oviedo-Trespalacios, O., 2021. Exploring women's experience of gender-based violence and other threats to safety on public transport in Bangladesh. International Journal for Crime, Justice and Social Democracy 10 (4), 158–173. https://doi.org/10.5204/ijcjsd.2086.
King, J., King, M., Oviedo-Trespalacios, O., Watling, H., Carroll, J.-A., Bull, M., Grant-Smith, D., Anam, M., Pen, S., Davidson, D., 2023. Women's empowerment through access to safe transport: the impact of sexual and nonsexual victimization on female commuters in Bangladesh and Cambodia. Violence Against Women, 10778012231214770. https://doi.org/10.1177/10778012231214770.
Lijarcio, I., Llamazares, F.J., Valle, E., Montoro, L., Useche, S.A., 2022. Assessing risk perception over recidivist traffic offenders from a multi-group approach: how gendered could it Be? The European Journal of Psychology Applied to Legal Context 14 (1), 33–41. https://doi.org/10.5093/ejpalc2022a4.
Liu, Y., Osorio, J., Ouyang, Y., 2023. How long it took transit ridership to recover from disruptive events: a review into the recent history. Journal of Public Transportation 25, 100051. https://doi.org/10.1016/j.jpubtr.2023.100051.
Lorenc, T., Petticrew, M., Whitehead, M., Neary, D., Clayton, S., Wright, K., Thomson, H., Cummins, S., Sowden, A., Renton, A., 2013. Environmental interventions to reduce fear of crime: systematic review of effectiveness. Syst. Rev. 2 (1), 30. https://doi.org/10.1186/2046-4053-2-30.
Macassa, G., McGrath, C., Wijk, K., Rashid, M., Hiswåls, A.S., Soares, J., 2023. The association between fear of crime, educational attainment, and health. Epidemiologia 4 (2), 148–162. https://doi.org/10.3390/epidemiologia4020016.
Mahadevia, D., Mukhopadhyay, C., Lathia, S., Gounder, K., 2023. The role of urban transport in delivering Sustainable Development Goal 11: learning from two Indian cities. Heliyon 9 (9), e19453. https://doi.org/10.1016/j.heliyon.2023.e19453.
Marteache, N., Bichler, G., Enriquez, J., 2015. Mind the gap: perceptions of passenger aggression and train car supervision in a commuter rail system. Journal of Public Transportation 18 (2), 61–73. https://doi.org/10.5038/2375-0901.18.2.5.
Milani, R., Carbajal, M., 2023. Experiences of street harassment and the active engagement of bystanders: insights from a Swiss sample of respondents. J. Interpers Violence 38 (19–20), 10640–10663. https://doi.org/10.1177/08862605231175912.
Nguyen-Phuoc, Q.D., Oviedo-Trespalacios, O., Vo, N.S., Thi Le, P., Van Nguyen, T., 2021. How does perceived risk affect passenger satisfaction and loyalty towards ride-sourcing services? Transport. Res. Transport Environ. 97, 102921 https://doi.org/10.1016/j.trd.2021.102921.
Okraszewska, R., Peters, N.V., Reisch, L.A., Flechtner-Mors, M., Kamphuis, C.B.M., Wendt, J., Scheller, D.A., Konsur, K., Żukowska, J., 2022. Sustainable Urban Mobility Plans: implementation process and indicators to evaluate effects on physical activity. Eur. J. Publ. Health 32 (Suppl. ment_4), iv101–iv106. https://doi.org/10.1093/eurpub/ckac069.
Orozco-Fontalvo, M., Soto, J., Arévalo, A., Oviedo-Trespalacios, O., 2019. Women's perceived risk of sexual harassment in a Bus Rapid Transit (BRT) system: the case of Barranquilla, Colombia. J. Transport Health 14, 100598. https://doi.org/10.1016/j.jth.2019.100598.
Östergren, P.-O., Canivet, C., Agardh, A., 2022. One-year incidence of sexual harassment and the contribution to poor mental health in the adult general population. Eur. J. Publ. Health 32 (3), 360–365. https://doi.org/10.1093/eurpub/ckab225.
Pani, A., Sahu, P., Mishra, S., 2023. Gender disparities in multimodal travel Attitudes, Behavior, and satisfaction. Transport. Res. Transport Environ. 123, 103917 https://doi.org/10.1016/j.trd.2023.103917.
Pillinger, J., 2017. Violence against Women at Work in Transport: Summary Report of Findings from a Survey by ETF. European Transport Workers' Federation - ETF. https://www.etf-europe.org/wp-content/uploads/2018/09/ETF-summary-report-VAW-at-work-in-transport_EN.pdf.
Pineda, D., Muris, P., Martínez-Martínez, A., Piqueras, J.A., 2023. Prevalence of child sexual abuse in Spain: a survey study. The European Journal of Psychology Applied to Legal Context 15 (2), 83–88. https://doi.org/10.5093/ejpalc2023a9.
Podsakoff, P.M., MacKenzie, S.B., Podsakoff, N.P., 2012. Sources of method bias in social science research and recommendations on how to control it. Annu. Rev. Psychol. 63 (1), 539–569. https://doi.org/10.1146/annurev-psych-120710-100452.
Quinones, L.M., 2020. Sexual harassment in public transport in Bogotá. Transport. Res. Pol. Pract. 139, 54–69. https://doi.org/10.1016/j.tra.2020.06.018.
Racioppi, F., Martuzzi, M., Matić, S., Braubach, M., Morris, G., Krzyżanowski, M., Jarosińska, D., Schmoll, O., Adamonytė, D., 2020. Reaching the sustainable development goals through healthy environments: are we on track? Eur. J. Publ. Health 30 (Suppl. ment_1), i14–i18. https://doi.org/10.1093/eurpub/ckaa028.
Rayment-McHugh, S., 2023. Understanding concentrations of sexual violence and abuse: a new theory. Violence Against Women 29 (12–13), 2639–2660. https://doi.org/10.1177/10778012231189481.
Riordan, S., 1999. Indecent exposure: the impact upon the victim's fear of sexual crime. J. Forensic Psychiatr. 10 (2), 309–316. https://doi.org/10.1080/09585189908403684.
Rodas-Zuleta, M.D.M., Cardona, S., Escobar, D.A., 2022. Gender-based violence and Women's mobility, findings from a medium-sized Colombian city: a quantitative approach. J. Transport Health 25, 101376. https://doi.org/10.1016/j.jth.2022.101376.

Rosembloom, S., 2007. Transportation patterns and problems of people with disabilities. In: Field, En M.J., Jette, A.M. (Eds.), The Future of Disability in America. National Academies Press. https://www.ncbi.nlm.nih.gov/books/NBK11420/.
Sardinha, L., Maheu-Giroux, M., Stöckl, H., Meyer, S.R., García-Moreno, C., 2022. Global, regional, and national prevalence estimates of physical or sexual, or both, intimate partner violence against women in 2018. Lancet 399 (10327), 803–813. https://doi.org/10.1016/S0140-6736(21)02664-7.
Soto, J., Orozco-Fontalvo, M., Useche, S.A., 2022. Public transportation and fear of crime at BRT Systems: approaching to the case of Barranquilla (Colombia) through integrated choice and latent variable models. Transport. Res. Pol. Pract. 155, 142–160. https://doi.org/10.1016/j.tra.2021.11.001.
Spicer, V., Song, J., 2017. The impact of transit growth on the perception of crime. J. Environ. Psychol. 54, 151–159. https://doi.org/10.1016/j.jenvp.2017.09.002.
Spiliopoulou, A., Witcomb, G.L., 2023. An exploratory investigation into women's experience of sexual harassment in the workplace. Violence Against Women 29 (9), 1853–1873. https://doi.org/10.1177/10778012221114921.
Stark, J., Meschik, M., 2018. Women's everyday mobility: frightening situations and their impacts on travel behaviour. Transport. Res. F Traffic Psychol. Behav. 54, 311–323. https://doi.org/10.1016/j.trf.2018.02.017.
Stensen, K., Lydersen, S., 2022. Internal consistency: from alpha to omega? Tidsskrift for Den norske legeforening. https://doi.org/10.4045/tidsskr.22.0112.
Su, Y., D'Arcy, C., Li, M., Meng, X., 2022. Trends and patterns of life satisfaction and its relationship with social support in Canada, 2009 to 2018. Sci. Rep. 12 (1), 9720. https://doi.org/10.1038/s41598-022-13794-x.
Summers, P., Chao, E., McCoy, P., Perry, J., Rhodes, S.D., 2020. Influencing public transportation policy through community engagement and coalition building: process and preliminary outcomes. Progress in Community Health Partnerships: Research, Education, and Action 14 (4), 489–498. https://doi.org/10.1353/cpr.2020.0054.
Useche, S.A., Colomer, N., Alonso, F., Faus, M., 2024. Invasion of privacy or structural violence? Harassment against women in public transport environments: a systematic review. PLoS One 18, e0296830. https://doi.org/10.1371/journal.pone.0296830.
Uteng, T., Turner, J., 2019. Addressing the linkages between gender and transport in low- and middle-income countries. Sustainability 11 (17). https://doi.org/10.3390/su11174555.
Uzzaman, M.A., Xulu-Kasaba, Z.N., Haque, M.E., 2021. Personal safety and fear of sexual harassment among female garment workers in Bangladesh. Int. J. Environ. Res. Publ. Health 18 (24). https://doi.org/10.3390/ijerph182413406.
Vanderschuren, M., Allen, H., Krause, P., Lane-Visser, T., 2023. Lessons learnt through gender-based travel data collection and related sexual harassment in Sub-Saharan Africa. Social Sciences & Humanities Open 7 (1), 100442. https://doi.org/10.1016/j.ssaho.2023.100442.
Veselinovic, M., 2023. Almost Half of Women Transport Workers Sexually Harassed in Last Year, RMT Union Survey Suggests. https://news.sky.com/story/almost-half-of-women-transport-workers-sexually-harassed-in-last-year-rmt-union-survey-suggests-13015661.
Wang, X., Chui, W.H., Wang, Y., 2022. Perception of gender equality matters: targets' responses to workplace sexual harassment in Chinese metropolises. J. Interpers Violence 37 (13–14), NP11933–NP11963. https://doi.org/10.1177/0886260521997452.
Watkins, K., 2018. Does the future of mobility depend on public transportation? Journal of Public Transportation 21 (1), 53–59. https://doi.org/10.5038/2375-0901.21.1.6.
Weckroth, M., Kemppainen, T., 2021. (Un)Happiness, where are you? Evaluating the relationship between urbanity, life satisfaction and economic development in a regional context. Regional Studies, Regional Science 8 (1), 207–227. https://doi.org/10.1080/21681376.2021.1925146.
Weinstein Agrawal, A., Laukaitou-Sideris, A., Tortora, C., Hu, Y., 2020. Crime and Harassment on Public Transportation: A Survey of SJSU Students Set in International Context. Mineta Transportation Institute. https://doi.org/10.31979/mti.2020.1810.