



Always on the defensive: The effects of transit sexual assault on travel behavior and experience in Colombia and Bolivia

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ARTICLE INFO

Keywords:

Public transit
Security
Gender
Trauma
Latin America
Mixed-methods

ABSTRACT

This mixed-methods study uses surveys and interviews with transit users to document the prevalence and effects of transit sexual assault in two Latin American transit systems: Bogotá, Colombia's TransMilenio BRT and informal transit in El Alto, Bolivia. Transit sexual assault is common in both systems, but more prevalent in the overcrowded TransMilenio system; 37% of female TransMilenio users reported experiencing unwanted sexual contact while using transit. Transit users in general are found to respond to the risk of transit crime by engaging in defensive behaviors such as avoiding travel at certain times of day, traveling in groups, taking more expensive modes, or avoiding travel altogether. Transit sexual assault victims are more likely to engage in these behaviors, and also engage in victim-specific defensive behaviors: selecting defensible positions within a carriage, standing near "safe" people (typically other women), or using objects to shield themselves. These habitual behaviors allow some victims to regain a sense of safety on transit, but others continue to struggle with hypervigilance, anxiety, and other responses to sexual trauma. It is imperative to prevent future transit sexual assaults, but many women have already been assaulted, are already traumatized, and need additional help to recover freedom of movement. Crowding reduction, improved reporting, bystander intervention, and women-only carriages are discussed as potential tools for ensuring that public transit is safe and welcoming for people of all genders.

1. Introduction

This study analyzes the prevalence and effects of transit sexual assault in two Latin American bus systems: the world-renowned TransMilenio Bus Rapid Transit, in Bogotá and Soacha, Colombia, and informal transit in El Alto and La Paz, Bolivia. Sexual assault and harassment are prevalent in transit systems in many developed and developing cities (Bhatt et al., 2015; Clark et al., 2016; Ceccato and Paz, 2017; Stringer, 2007). Chronic transit insecurity has deleterious impacts on women's freedom of movement and wellbeing (Condon et al., 2007; Clark et al., 2016; Gardner et al., 2017). However, the problem remains understudied and inadequately addressed in many cities (Loukaitou-Sideris, 2016; Ceccato and Paz, 2017; Lubitow et al., 2017; Smith, 2008).

Further, while most assaults occur in crowded conditions (Ball and Wesson, 2017; Ceccato and Paz, 2017; Clark et al., 2016), most existing research on women's safety focuses on the fear of isolated environments and late-night travel (e.g. Loukaitou-Sideris, 2014; Smith, 2008). The focus on isolation has resulted in inadequate guidance about how to address the riskiest transit environment for

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<https://doi.org/10.1016/j.jth.2019.04.004>

Received 10 October 2018; Accepted 24 April 2019

Available online 14 May 2019

2214-1405/ © 2019 Published by Elsevier Ltd.

women: crowded vehicles and platforms (Ceccato and Paz, 2017; Ball and Wesson, 2017; Clark et al., 2016). Further, the dearth of studies of the effects on victims specifically poses an obstacle to identifying strategies for restoring freedom of movement to women who have already been harmed by insecure transit.

This mixed-methods study addresses these gaps through surveys and interviews with transit users, both victims of sexual assault and users who have not been victimized. The study: (1) documents the frequency of transit sexual assault, (2) examines behavioral responses to insecure transit, (3) quantitatively compares the travel behavior of victims of transit sexual assault with that of other users, and (4) illuminates the effect of transit sexual assault on the victims' qualitative and emotional experience of public transit.

Transit sexual assault is found to be common in El Alto, and even more common in Bogotá's overcrowded TransMilenio, where 37% of female users reported having experienced unwanted sexual contact. Transit users in general respond to transit insecurity by engaging in defensive behaviors such as avoiding travel at certain times of day, traveling in groups, taking more expensive modes, or avoiding travel altogether. Transit sexual assault victims are even more likely to engage in these behaviors. Further, when victims re-enter transit by necessity or choice, many experience chronic fear, anxiety, and hypervigilance. To manage this distress, they engage in victim-specific defensive behaviors: selecting specific positions within a carriage, standing near "safe" people (typically other women), or using objects to physically and emotionally protect themselves from crowded conditions. The effort required to cope with fears of being re-victimized colors many victims' daily experience of transit and infringes on their right to freely access public space.

It is critical to identify evidence-based strategies to prevent sexual assault; it is equally important to restore freedom of movement to women who have already been harmed by insecure transit. Reducing overcrowding, improving reporting, and promoting bystander intervention are critical to both these imperatives. While women-only transportation is controversial and not a long-term solution, I argue that it should be considered in the short-term because it facilitates a defensive strategy already employed by some victims: standing near other women. These policies are promising tools for helping planners provide transit service that is safe and welcoming for people of all genders.

2. Background

Sexual assault and harassment encompass an array of behaviors that mainly target women (Stringer, 2007; Clark et al., 2016; Madan and Nalla, 2016). These acts can be verbal (sexual comments or intrusive questioning), physical (touching, fondling, groping, rape), or based on exposure (exhibitionism, showing pornography). Here, I define sexual assault as any form of unwanted physical contact, and harassment as non-contact forms of sexual aggression.²

Although public transit accounts for a large share of sexual assaults in public spaces, transit sexual assault specifically is understudied (Loukaitou-Sideris, 2014; Ball and Wesson, 2017; Clark et al., 2016). It is known that sexual assault and harassment are endemic to many transit systems in both developed and developing cities (e.g. Natarajan et al., 2017; Bhatt et al., 2015; Clark et al., 2016; Ceccato and Paz, 2017; Stringer, 2007; Horii and Burgess, 2012; Dunckel-Graglia, 2013). Non-penetrative acts such as fondling and frotteurism (genital rubbing) are the most common type of transit sexual assault.

The overwhelming majority of victims of sexual assault and harassment in public space and on transit are cisgender women (Stringer, 2007; Clark et al., 2016; Madan and Nalla, 2016). Women who are also members of other marginalized groups, such as racial minorities and those with physical and mental disabilities, are disproportionately affected (Iudici et al., 2017; Lubitow et al., 2017). Gender non-conforming people (e.g. transgender and non-binary individuals) also face elevated risk (Ceccato and Paz, 2017; Lombardi et al., 2002).

Transit sexual assaults are dramatically underreported (Ceccato and Paz, 2017; Stringer, 2007; Tudela Rivadeneyra et al., 2015). Many victims stay silent out of shame or fear of being blamed (Lea et al., 2017). When victims attempt to report to police or transit agencies, they often encounter hostility or indifference about incidents that are dismissed as not 'serious' (Clark et al., 2016); this compounds an already-upsetting experience (Natarajan et al., 2017). Transportation planners are not immune to similarly dismissive attitudes. Planners in many cities have yet to take action, in part due to a perception that incidents of transit sexual harassment and assault are minor 'nuisance' crimes. (Clark et al., 2016; Ball and Wesson, 2017).

Most transit sexual assaults occur in crowded conditions during peak hours (Ball and Wesson, 2017; Ceccato and Paz, 2017). Crowding obligates passengers to submit to contact that would normally be a violation of social norms, allowing perpetrators to camouflage their actions as "legitimate" inappropriate behavior" (Ceccato and Paz, 2017, 13). The ambiguity of a crowd also inhibits bystander intervention (Ball and Wesson, 2017).

Scholarship on transit sexual assault, in contrast, has typically focused on the risk of *isolated* places (e.g. Loukaitou-Sideris, 2014; Wallace et al., 1999; Smith, 2008; Yavuz and Welch, 2010). As a result, many common policy prescriptions, such as improving lighting, sight lines, and presence of bystanders, fail to address the spatial context in which most assaults occur. While promoting 'safety in numbers' can ease women's fear at isolated transit stops (Loukaitou-Sideris, 2014), women who have been assaulted on crowded vehicles and platforms are painfully aware that numbers are far from 'safe.'

Several Latin American cities are taking the lead in identifying and enacting strategies to make transit safer for women at any time of day. Some cities, including São Paulo, are implementing hotlines or apps where women can report incidents without having to interact with police (Ceccato and Paz, 2017). Quito is taking this a step further, with a text message hotline that will cause an alert message to play in real time in the transit vehicle where the problem is reported (Carvajal, 2017). Public awareness and education

² As there is no universally accepted dividing line between harassment and assault, to allow cross-study comparisons, it is necessary for researchers to specify their definitions (Madan and Nalla, 2016).

campaigns targeted at improving bystander intervention are popular among women (Tudela Rivadeneyra et al., 2015). Some cities have experimented with women-only carriages or separate services for women, though the efficacy and equity of these ‘pink’ services are hotly debated (Dunckel-Graglia, 2013; Tudela Rivadeneyra et al., 2015).

There are a growing number of efforts to disseminate best practices for identifying and meeting women's needs for safe transportation in Latin American cities (e.g. Allen et al., 2017). However, at the time of data collection, no significant transit safety programs were in effect in Bogotá/Soacha or El Alto/La Paz.

2.1. The effects of fear

There is a large body of evidence that fear of crime, particularly sexual violence, on public transit disproportionately affects women and decreases women's mobility (e.g. Condon et al., 2007; Loukaitou-Sideris, 2014; Valentine, 1989; Allen et al., 2017). The most obvious results of women's fear are ‘avoidance behaviors’ (de Jubainville and Vanier, 2017): women avoid travel at night or during rush hour (de Jubainville and Vanier, 2017, Clark et al., 2016). Women avoid routes, neighborhoods, or locations perceived as dangerous, such as isolated transit waiting areas (Loukaitou-Sideris, 2014; Smith, 2008; Yavuz and Welch, 2010). Fear of crime decreases women's transit use and increases the usage of private autos (Loukaitou-Sideris, 2014; Delbosc and Currie, 2012). This effect may intensify as rising incomes make private transit attainable for more women (Allen et al., 2017).

Women also adopt defensive strategies that allow them to go out in spite of their fear (Condon et al., 2007; Dunckel-Graglia, 2013; Natarajan et al., 2017). Traveling in groups is common, as well as engaging in “constant vigilance” (Condon et al., 2007): heightened situational awareness of the physical environment and the possible intentions of other people.

2.2. The effects of sexual assault on victims

Although the effects of *fear* of transit sexual assault are well-documented, there are few studies on the effects of actually experiencing sexual assault and harassment. There is therefore an urgent need for information about the effects of transit sexual assault on victims' wellbeing and behavior.

Sexual assault in general has been clinically linked to symptoms of trauma (Massicotte, 2012). As summarized by Rooney (2012), the emotional consequences of trauma include anxiety, fearfulness, depression, withdrawal, and difficulty concentrating. In addition to the emotional and psychological effects, trauma can result in social consequences (such as a difficulty trusting others), economic consequences due to missed work or changes in travel patterns, and an increased vulnerability to physical health problems (Massicotte, 2012).

Traumatic exposure can result in mental health problems including clinical depression and Post Traumatic Stress Disorder (PTSD). However, even subclinical symptoms (i.e. below the threshold for these diagnoses) can impact quality of life and, if left untreated, escalate over time (Nader, 2012). Survivors of sexual trauma are especially likely to experience an acute and long-term erosion of their sense of safety (Rooney, 2012).

Trauma response is determined by the interaction of a range of factors, including not only the intensity of the stressor, but also personal history, repeated exposure to similar incidents, and availability or lack of social support (Nader, 2012). It is therefore important not to trivialize the experiences of victims of ‘lesser’ crimes (Clark et al., 2016; Ball and Wesson, 2017). For example, Clark et al. (2016) found that one third of female college students who experienced frotteurism suffered long-term harm.

Many trauma survivors experience hypervigilance, a stressful state characterized by fear, anxiety, and a need to continuously scan their surroundings for danger (Greenwald, 2012). Many women who have not been assaulted exhibit heightened situational awareness when traveling (Condon et al., 2007). However, in the case of hypervigilance, the enhanced situational awareness is accompanied by significant emotional distress. These chronic behavioral and emotional effects are not yet well documented in the context of public transit; the present study addresses this gap.

2.3. Case background: Informal transit in el Alto, Bolivia

El Alto, Bolivia began as an outgrowth of La Paz, the capital of Bolivia. These cities still form an integrated metropolitan area. However, with more than 1,000,000 residents and increasing local employment opportunities, El Alto is now the larger of the two cities. As in many developing cities, public transit in El Alto is largely informal; it is provided by individual *transportistas* who either own their vehicle or lease it from a small company. These drivers earn their livings directly from the fares they collect, which results in an economic incentive to neglect vehicle maintenance, abandon service in unprofitable neighborhoods, and discriminate against passengers who are entitled to lower fares or may be slow to board and alight (Cervero and Golub, 2011; Pando Solares, 2012). However, the government lacks regulatory enforcement capacity and is largely unsuccessful at curbing the abusive behaviors described above (Kash, 2017).

This study focuses predominantly on residents of El Alto, but because the informal transport networks blends with that of La Paz, some interviews with residents of La Paz are incorporated. The system is one of the most atomized in Latin America. A minority of service is provided by 36-passenger “microbuses,” 60% of which are at least thirty years old. More recently, these vehicles have been

Table 1
Sample characteristics.

	Total	TransMilenio Users (Colombia)	Informal Transit Users (Bolivia)	Female
Extended interviews^a	29	14	15	46%
Users: Sexual Assault Victims	10	6	4	80%
Users: Not Sexual Assault Victims	19	8	11	42%
Transit User Surveys	1444	593	851	49%
Low Socio-Economic Status ^b		6%	52%	
Mean age		32.3	29.2	
Female		43%	52%	
Live in Bogotá (vs Soacha) ^c		52%		

^a Most extended interviews were with individuals; a few were with small groups.

^b In Bolivia, this measure was based on poverty. In Colombia, I use strata, a neighborhood-level indicator used to determine eligibility for social services and subsidies. Strata ranges from 1 to 6; I define strata 1 as low SES.

^c To serve local data needs, residents of Soacha were disproportionately sampled. To correct for this, in descriptive statistics about TransMilenio users are weighted by city and gender. The Bolivia results and all regression models are unweighted.

supplanted 14-passenger vans known locally as minibuses (Pando Solares, 2012). The small vehicles composing the massive informal transit fleet bring traffic in the city centers to a standstill, erode local air quality, and decrease road safety. However, as we shall see, this broadly dysfunctional system has one important accidental benefit: the fact that all minibus passengers travel seated minimizes crowding and insulates from the risk of transit crime.

2.4. Case background: TransMilenio Bus Rapid Transit

Since its launch in Bogotá, Colombia in 2000, TransMilenio has been considered a leader in the Bus Rapid Transit (BRT) movement (Suzuki et al., 2013). BRT is a bus system characterized by 1. Exclusive, physically protected bus lanes; 2. Elevated stations where users pay their fare before entering the platform; 3. At-grade boarding, where users walk directly from an elevated platform onto a bus (Suzuki et al., 2013). TransMilenio has received numerous international awards recognizing its success in increasing sustainability, reducing travel times, and promoting road safety, among other achievements (Suzuki et al., 2013), and has been credited with popularizing BRT in developing and developed countries (Hidalgo and Gutiérrez, 2013).

In 2013, TransMilenio expanded to the neighboring municipality of Soacha, providing Soacha's predominantly low-income population with faster access to Bogotá. By the beginning of this study in 2015, TransMilenio transported approximately two million passengers each weekday.³ However, in recent years, quality of service, operating speeds, and user satisfaction have declined precipitously, primarily due to severe crowding (Kash, 2018). In 2016, 2017, TransMilenio was the most used but worst rated transportation option in the city of Bogotá, with fewer than 20% of users rating it as satisfactory (Bogotá; ¿Cómo Vamos? 2017).

3. Methods

A mixed methods approach was used to generate statistically representative data and an in-depth understanding of the experiences of victims of sexual assault. In each country, an intercept survey of and in-depth interviews with transit users were conducted over four visits in 2014–2016 (Table 1). The study dataset also contains extended interviews with transit planners and semistructured “in transit” field interviews with users; these were used to design the survey and interview guides, but are not directly analyzed here.

The user surveys were intercept surveys conducted at rush hour in transit stations. A stratified random cluster sampling strategy was employed; the cities were divided into sectors and survey sites were selected randomly from among the stations within each sector. To serve local data needs on the TransMilenio survey, users in Soacha were intentionally oversampled; descriptive statistics about TransMilenio users presented here adjust for this by weighting for city and gender.

The in-depth interviews used a purposive diversity sampling design, ensuring representation of different genders, economic backgrounds, ages, and neighborhoods. Interviews were conducted with both victims of sexual assault and users who had not been victimized. Interview participants for extended transit user interviews were identified through volunteers from the survey and in-transit interviews, as well as in collaboration with local community organizations. These initial informants sometimes served as the beginning of a sample chain.

Both survey and interview participants first discussed the problems with transportation generally, and were then asked more specifically about sexual assault.

³ Informal transit is also prominent in Soacha and present to a limited degree in Bogotá. This study focuses specifically on TransMilenio service in Colombia, and informal transit only in Bolivia.

Table 2

Personal experience with transit crime in Colombia and Bolivia.

Experience of Crime on Transit (Reference period: ever)	TransMilenio Users (Colombia)	Informal Transit Users (Bolivia)
Have been sexually assaulted (women only) ^a	37.2%	21.9%
Have been ambiguously touched (women only)	44.1%	–
Witnessed assault	34.6%	35.0%
Heard about Assault from a victim ^b	64.3%	36.1%
Have been robbed	49.4%	21.4%
Witnessed Robbery	58.2%	55.2%
Heard about robbery from a victim	85.9%	58.4%

^a To reduce underreporting, the question referred to having been ‘touched inappropriately or assaulted.’ Originally, this question was intended for both men and women. However, field pretesting revealed that a number of male respondents were interpreting the question to include non-sexual incidents like being shoved.

^b Respondents were asked about hearing personal experiences specifically from “friends, family, or another person they know.”

3.1. Survey questionnaire

In addition to more general questions about transportation usage and opinions, survey participants were asked about their personal experience with transit crime, including whether they had ever been victims of robbery or, for women, sexual assault. They were also asked about witnessing these crimes, or being told about them by a victim. To reflect local conditions, a question was added to the TransMilenio survey about whether women had been touched in a way that made them feel uncomfortable but the person's motives were ambiguous. Respondents for surveys in both cities were also asked about engaging in five defensive behaviors as a response to the risk of crime, including avoiding night travel, not making trips, traveling in groups, and taking more expensive transport. Relevant questions from the surveys are available in [Appendix A](#). Questionnaires were field tested by enumerators before final revisions.

3.2. Extended interview procedures

Extended interview participants responded to an unstructured module of questions about the principal problems with public transport, as identified by the respondent. They were then prompted for a more focused discussion on transit sexual assault. Assault victims described their experiences and any ways their behavior and perception had changed in the aftermath of their assault(s). To provide a point of comparison, non-victims were also asked about their perceptions of safety and security-related behaviors. Participants were also invited to comment on cards containing information about sexual assault (see [Appendix B](#)), mainly preliminary results from the surveys and excerpts from prior interviews with victims. Respondents also discussed incidents of assault they had witnessed or heard about from friends and family members.

3.3. Data analysis

The survey data is used to document the frequency of transit sexual assault and the prevalence of defensive behaviors. In addition to descriptive statistics, logistic regression is used to model the likelihood that a transit user will report engaging in defensive behaviors in response to transit insecurity as a function of crime victimization. Separate models are estimated for each behavior measured, with a common set of independent variables for all models in a given country. Sexual assault is measured categorically in a variable with three groups: women who have not been assaulted (base category), women who have been assaulted, and men. Robbery victimization is a binary variable.

Interview data was analyzed primarily through memos and data reduction strategies such as tables and incident diagrams. These strategies searched for common themes within the experiences of sexual assault victims, and examined to what extent these experiences differed from those of other transit users. Qualitative data is a valuable tool for emergent findings, and the interview analysis revealed two defensive behaviors that were not included in the survey.

4. Results

As [Table 2](#) shows, transit crime was a common problem in both systems, but it was substantially more common on TransMilenio; 37% of female TransMilenio users reported being subject to unwanted sexual contact while using the system, versus 22% of *alteñas*. In

both countries, the most common types of sexual assaults reported were fondling and frotteurism. The rate of robbery on TransMilenio was more than double that measured in El Alto. Additionally, the majority of respondents in both places had second-hand experience with transit crime through witnessing an incident or hearing from a friend or family member who had been victimized. No significant difference in rates of robbery by gender was observed in either city.

Most robberies and all but one of the sexual assaults reported in interviews were committed in crowded areas. Crowding provides camouflage for assailants, normalizes intimate contact with strangers, and creates ambiguity. Some victims of frotteurism realized belatedly that they were experiencing inappropriate contact, for example noticing that the man pressed up behind them had ample space to move away. In other cases, the extreme crowding made it impossible to determine to whom an offending hand was attached.

Crowding-related ambiguity was commonly described as an inhibiting factor for women speaking up. Approximately half of victims who identified an incident as unambiguously inappropriate reacted verbally or physically. Speaking up sometimes resulted in help from other passengers or staff, but not always. For example, when a drunk man sat down next to Juana⁴ and began hugging and kissing her, she asked the driver to intervene. When he didn't respond, she demanded that he stop the bus and got off herself, waiting for a second bus and paying an extra fare:

It makes me mad [The driver and his helper] knew that this person was drunk. Their duty should have been to leave him behind or intervene somehow. But since they didn't do anything, I had to stay behind.⁵

Fear of an experience like Juana's prevents some women from speaking up during or after an assault. One woman described being chastised by her parents for having confronted her assailant. Another victim was chastised by her mother for wearing a skirt. A woman who was assaulted at age eight simply did not have the words to describe her experience at the time. Juana herself elected not to tell her husband and son out of a fear of a negative reaction, though she did speak with her daughters "so that they could avoid that type of problem."

Women can face blame for responding, but they are sometimes also chastised for not speaking up:

"If you don't speak up, it's because you're permitting it." -Nina

This sentiment was most common among users like Nina who had not experienced assault, but some victims voiced similar opinions. Unfortunately, many other factors discourage women from speaking up. Violeta's experience captures the most commonly-cited reasons:

You freeze up because you don't know what to say Maybe he didn't mean to do it and I'll feel bad, like I overreacted. If he's going to have a violent reaction, why create a violent atmosphere? One prefers to just act like nothing is happening, and get off at the next stop. But I take ... an express route, ...so I had to stand it for half an hour, feel him rubbing my bottom with his pelvis, and that's very uncomfortable. And without having the power to react like I should, saying to him: "Sir, you have lots of space, please stop pushing me," or "don't crowd me." But I believe I don't have enough determination to be like other women, because I've seen that there are some women who do complain.

Women who feel unable to advocate for themselves, whether due to personality, socialization, or age, are especially vulnerable to the effects of assault. Bystanders are unlikely to intervene when victims do not verbally react; only one such incident was documented. Women who spoke up were more likely to receive aid. When bystanders did intervene, the helpful actions cited by victims included verbally confronting the assailant and changing positions with the victim, allowing the bystander to serve as a physical barrier between victimizer and victim.

Very few of the incidents discussed were reported to police. Many were concerned they would not be taken seriously; one laughed at the idea that the transit police, who regularly hit on her, would respond to a sexual assault complaint respectfully. The police were viewed as unlikely to take action, and possibly corrupt. Additionally, the reporting process can be time intensive, a particular concern during morning rush hour. The only victim to report her assault to the police was unusually familiar with the legal system due to her employment at an organization that focuses on violence against women.

4.1. Defensive behaviors among transit users

Insecure transit can affect the travel behavior of crime victims, but also that of users who have never been victimized. Table 3 summarizes eight defensive behaviors. Five behaviors were included in the surveys, and 74% of TransMilenio users (Colombia) and 86% of *alteños* (Bolivia) reported engaging in at least one of these behaviors in the past thirty days. Three additional behaviors,

⁴ Names have been changed.

⁵ For a longer excerpt from this interview and descriptions of other incidents, see [appendix B](#).

Table 3

Defensive behaviors adopted by transit users.

Defensive Behavior	Percent of transit users who report engaging in behavior within the past 30 days		Typical Examples from interviews
	TransMilenio Users (Colombia)	Informal Transit Users (Bolivia)	
Temporal Avoidance: <i>Avoiding traveling at certain times of day</i>			
1. Avoid night travel	46%	51%	"We don't go out at night because it's frightening because there aren't [frequent] buses." -Cesira, Bolivia
2. Avoid rush hour	— ^a	—	"I'd never get on a microbus at rush hour because, God, what if you have to get on and a man takes advantage and rubs against you and everything? It's disgusting." -Sanzet, Bolivia** ^b
Group Travel: <i>Traveling with a protector or seeking safety in numbers</i>			
3. Someone accompanied me	31%	35%	"It's terrible to think that because we're women, we can't take public transit by ourselves at eight o'clock at night ... One doesn't want to be sexist, but this type of thing obligates you to have some sexist behaviors, like 'Accompany me because otherwise I'll be afraid.' And he has to be a man, and he has to be big, and he has to be imposing. And so, you reproduce systemic sexism." -Violeta, Colombia** "We're afraid to get on public transit alone, so we have to go in a group of five people together." -Fiona, Bolivia
4. I accompanied someone	54%	33%	"I have to take two buses to take my daughters to school ... and I waste a lot of time But generally, I never send my daughters on public transit [alone]." -Lena, Bolivia
Mode Shifts and Suppressed Demand			
5. Took more expensive mode	35%	39%	"I take a lot of taxis out of pure fear." -Nina, Colombia
6. Didn't make a trip	29%	17%	"I've preferred to stay home so that it doesn't happen to me anymore." -Juana, Bolivia**
Responses to Victimization: <i>Behaviors observed primarily or exclusively among transit sexual assault victims</i>			
7. Defensive Positioning	—	—	"I always keep my back to the door, but when I can't, like if somebody gets on after me, I look for a way to make sure nobody is behind me." -Violeta, Colombia** "I always try to be next to women, because with men, you don't know who is good or who is bad, or who is going to do something obscene to you." -Jazmín, Colombia**
8. Defensive Objects	—	—	"I put my backpack in front of me and stick out my elbows so that nobody can get close to me." -Violeta, Colombia** "I always tell women to carry an umbrella. It's the best tool we women have!" -Heidi, Colombia**, who hit her attacker with an umbrella

^a Behaviors with no frequency listed were not included in the survey because they are emergent findings from interview analysis, which occurred after survey data collection.

^b ** indicates that respondent has experienced transit sexual assault. All names have been changed.

avoiding rush hour travel, defensive positioning, and the use of defensive objects, emerged during interview analysis. Defensive positioning and objects were observed predominantly among sexual assault victims, and will be revisited in section 4.2.

4.1.1. Crime victimization and behavior

Logistic regression was used on the survey data to model the likelihood that a transit user will alter his or her behavior in response to transit insecurity (Table 4). Having been sexually assaulted is associated with an increased likelihood of engaging in every defensive behavior measured; most of these associations were statistically significant ($\alpha = 0.05$). Compared to women who have not been assaulted, female sexual assault victims in both case sites were twice as likely to avoid travel due to safety concerns, a significant restriction on their mobility. Colombian victims were also more than twice as likely as non-victims to avoid night travel and take more expensive modes of transportation, and 1.7 times as likely to travel accompanied by another person for safety.

Table 4

Behavior changes due to the risk of transit crime (Logistic Regression).

	Avoid Night Travel	Someone accompanied me	I accompanied someone	Took more expensive mode	Didn't Make a Trip
TRANSMILENIO, COLOMBIA					
Group (base: female non-victims of sexual assault)					
Female victims of sexual assault	2.408 ***	1.771 **	1.446 *	2.103 **	2.195 **
Female non-victims	(reference)				
Men	0.780	0.176 ***	1.844 ***	1.886 ***	1.138
Have been Robbed	0.957	1.187	1.337	1.580 ***	1.151
Live in Soacha (vs Bogotá)	0.633 *	0.891	0.870	0.624	0.639 *
Low SES (strata 1)	0.796	0.257 **	0.581 *	0.426 ***	0.464
Age (years)	0.994	0.978 *	0.977 ***	1.000	1.001
Pseudo R2	0.036	0.164	0.032	0.042	0.026
N	562	562	562	562	562
BOLIVIA					
Group (base: female non-victims of sexual assault)					
Female victims of sexual assault	1.457	1.208	2.024 **	1.606 *	1.944 **
Female non-victims	(reference)				
Men	1.292	0.512 ***	1.871 ***	1.788 ***	2.284 ***
Have been Robbed	0.652 **	1.204	1.128	1.345	1.130
Poor	1.209	0.861	1.050	0.778	0.648
Age	0.990	0.978 **	0.978 *	1.002	0.961 ***
Pseudo R2	0.013	0.039	0.026	0.022	0.049
N	528	526	529	528	527

* denotes significance for $\alpha = 0.10$, ** for $\alpha = 0.05$, and *** for $\alpha = 0.01$ Odds ratios shown. Standard errors clustered by survey site.

Assault victims were also more likely to accompany someone else for their safety, though in Colombia the effect was marginally significant. This counterintuitive tendency to spend extra time in unsafe transit is probably best explained by interview responses from middle-aged victims; many expressed heightened concern for their daughters' safety.

Robbery victimization was associated with an increased likelihood of choosing expensive transportation in Colombia. Otherwise, robbery victimization was not associated with an increased likelihood of engaging in defensive behaviors.⁶

4.2. Effects of sexual assault on victims

In interviews, assault victims reported quantitatively more and qualitatively more intense behavior changes than women who had not been assaulted, concurring with the survey findings. When the emergent behaviors of defensive positioning and defensive objects are considered, all female victims changed their behavior; this was not observed in the two male victims interviewed.

Short-term emotional consequences were near-universal for female victims, and present in one of the two male victims interviewed. Victims reported emotional distress and anxiety during and shortly after their assault(s).⁷ Five female and one male victim also reported longer-term emotional effects. Six years after her assault, Mariana noted

I don't feel comfortable on TransMilenio. You're *always on the defensive* so they don't touch you, watching out to see who's in front of you, who's behind you, who's all around you.

This stressful state of heightened alert, known as hypervigilance, is a common psychological response to sexual trauma (Greenwald, 2012). Accessing public transit, especially in crowded conditions, requires women who have been assaulted to reenter a situation that, for many, feels distressingly unsafe, and where there is an objective risk of revictimization.

As a result, for some women, an incident of sexual assault fundamentally transforms the daily experience of taking transit. The inevitable contact with strangers provokes anxiety, as Violeta explains: "Any touch I feel on my bottom, whether it's with an umbrella or the edge of a bag, puts me on alert The first thing I think is 'they're touching me.'" In the survey, 63.4% of TransMilenio users who had been sexually assaulted also reported having been touched in a way that made them feel uncomfortable, but being uncertain as to whether it was intentional (as compared to 33.5% of women who had not been assaulted).

This persistent anxiety can be severe enough to generate long-lasting effects on travel behavior and emotional wellbeing. To avoid

⁶ The inverse relationship between robbery victimization and avoiding night travel in the Bolivian survey might indicate that those who are obligated to travel at night are at increased risk of robbery.

⁷ The other male victim believed assault affects women strongly, but said that, as a man, he "never felt like [he] was in danger."

the sometimes-considerable distress of returning to public transit, many with the means opt for private transportation. Others must choose between reducing their freedom of movement and using a service that is psychologically and objectively risky.

When they return to transit by choice or necessity, almost all assault victims interviewed engage in defensive positioning and/or the use of defensive objects (Table 3). Women choose a location within the bus they perceive as safer, typically either up front near the driver, somewhere nobody can be behind them (e.g. back to the wall or in the rear of the bus), or near other women or elderly people. Some victims also use objects as shields to insulate themselves or as potential weapons. Victims engage in these behaviors *whether or not they perceive any specific person to be a threat*, and whether or not they reported lasting emotional distress. With the exception of two women who were sexually assaulted somewhere besides public transit, interviewees who had not experienced transit sexual assault did not engage in defensive positioning.

Victims' defensive behaviors become a routine part of taking transit, carving out a safer-feeling personal space within a threatening environment. Violeta, for example, makes herself comfortable on her commute to university by carrying a backpack in front of her, sticking her elbows out, wearing headphones, and making sure she is the last person to board her bus so that she can keep her back against the door (Table 3). However:

There was this super-uncomfortable time when I [forgot my] headphones, so I couldn't listen to music, and suddenly ... the guy next to me ..., began to ask things like "and what do you study?" "And what semester are you in?" And I was thinking, dammit, I don't want to keep talking to him, but I have to stand it for at least 25 minutes because this TransMilenio won't stop And he ... began to ask things like when could we get lunch and when could we see each other again, and how he works near my university. And I don't like to be rude [but] he kept talking and talking, and I wasn't even saying "and you?" He asked questions, and I just answered ... until I got off the bus ... and ran. –Violeta

Violeta's example demonstrates how fragile these defensive rituals can be; simply forgetting her headphones undid her efforts to reclaim a sense of safety in public transit. Violeta did not see her attacker's face, and lamented that he might have been anyone, lurking on any bus. He could even be the security guard at her college. For victims, transit sexual assault is not a one-time experience; it can have lasting behavioral and emotional effects that intrude on daily life on and off of transit.

5. Discussion

There is growing acknowledgment that transit sexual harassment and assault are common in cities around the world, and that they have serious effects on travel behavior and victims' wellbeing (Allen et al., 2017; Clark et al., 2016; Bhatt et al., 2015; Condon et al., 2007; Gardner et al., 2017; Horii and Burgess, 2012; Ceccato and Paz, 2017). This study adds to that body of evidence, and underscores that a system's modernity does not necessarily equate to safety. The broadly dysfunctional informal transit in El Alto inadvertently protects female users by allowing most passengers to travel sitting down. Conversely, overcrowding in the award-winning TransMilenio BRT exposes female users to a higher risk of sexual assault but also addresses an important gap in the literature by examining the impacts of transit sexual assault specifically on its victims. "Normal" defensive behaviors documented among transit users in general are more common among victims of sexual assault; women who have been victimized are more likely than other users to modify their travel behavior in ways that restrict their mobility, or to take on a higher financial burden in order to feel safe.

However, perhaps an even more important finding of this study is that it documents clinically studied responses of sexual trauma in general among women who have experienced sexual assault on public transport specifically; anxiety, hypervigilance, difficulty trusting, and fear were common responses (Greenwald, 2012; Massicotte, 2012). Victims almost universally attempt to manage their rational anxiety about being assaulted again by adopting defensive positions to physically and psychologically protect themselves from their fellow passengers; these adaptations were absent among non-victims. For some assault victims, these behaviors are sufficient to restore a sense of personal safety. For others, the distressing aftereffects of transit sexual assault color their daily experience of transit and detract from their quality of life for years after an attack. Given these findings of real harm to victims, the idea that transit sexual assault is primarily a 'nuisance' rather than a 'serious' crime is indefensible. Planners can and must provide safer transit for people of all genders.

Unfortunately, as of writing, neither *alteñas* nor *bogotanas* enjoy access to transit that is significantly safer than it was at the time of interviews. This lack of progress is partially due to general issues of resources and capacity. Planners in El Alto were unable to ensure that informal operators complied with even basic regulations about routes and allowable fares (Kash, 2017). TransMilenio began offering preferential boarding doors for women in select stations. However, the overcrowding contributing to TransMilenio's high rates of transit sexual assault also neutralized the effectiveness of this small step; few rush hour passengers respected priority areas.

Beyond logistical constraints, a major inhibitor to effective action in both cities is that many planners, whose interview responses are examined in greater detail elsewhere (Kash, 2018), simply did not view transit sexual assault as a problem. Their views were informed by several common *deproblematizing beliefs*, or beliefs that encourage planners to view sexual assault as a non-issue. Of particular salience, many planners believe that (1) victims of sexual assault on transit are often mistaken or lying; (2) groping and sexual rubbing do not seriously harm victims; and (3) victims brought the attack on themselves. Documenting the harm transit sexual assault causes to victims (and, perhaps more pragmatically, to revenues) is critical for combatting these documentably false beliefs, building empathy, and motivating planners to take action (Loukaitou-Sideris, 2014; Delbosc and Currie, 2012; Clark et al., 2016).

5.1. Policy implications

We cannot prevent the fear of crime from impacting women's wellbeing and mobility if we fail to protect them from a very real

risk of transit sexual harassment and assault. The Situational Crime Prevention framework (Smith, 2008; Natarajan et al., 2015), usually applied to violent crime, provides a useful model for an integrated strategy for reducing assaults. Planners can focus on reducing opportunities, increasing the likelihood of detection, and removing excuses. Where overcrowding is present, crowding reduction is paramount to all these strategies. Crowding maximizes opportunity to commit assault by normalizing close contact with strangers, providing plausible deniability, and sometimes physically preventing victims from escaping. By creating ambiguity, crowding also renders many assaults essentially unprosecutable, foreclosing any potential legal consequences for the perpetrator. Planners should take cues from female users' preferences, which tend to emphasize human-centered approaches such as station attendants rather than technological fixes such as security cameras (Loukaitou-Sideris, 2014; Cho and Park, 2017).

However, this study shows that many women have already been harmed by sexual assault; preventing future crimes will not automatically restore their freedom of movement. In addition to policies aimed at prevention and punishment, it is critical to care for existing victims. Several prevention strategies can serve a dual purpose of increasing victims' comfort. Crowding reduction makes it possible for victims to preserve a personal space and avoid excessive contact with potential assailants. Because a supportive response from a bystander, transit official, or law enforcement officer can reduce future trauma (Ullman and Filipas, 2001), improving reporting processes and promoting bystander intervention are both critical policy avenues (Ullman and Filipas, 2001., Ceccato and Paz, 2017, Stringer, 2007, Tripathi et al., 2017, Tudela Rivadeneyra et al., 2015).

Some strategies to care for existing victims may be worth considering regardless of whether or not they will prevent future assaults. One such policy is women-only carriages and services, perhaps the most controversial transit safety intervention. In addition to a lack of evidence that they reduce transit crime, women-only services typically serve only a minority of female users, and may not be welcoming to vulnerable gender-nonconforming people (Dunckel-Graglia, 2013; Horii and Burgess, 2012). There are also valid concerns about the notion of safety through segregation (Loukaitou-Sideris, 2016, Tudela Rivadeneyra et al., 2015).

Despite these legitimate critiques, there is an important argument for considering women-only transit in the short term: it provides a way for women who are already suffering from sexual trauma to recover their freedom of movement. This research has described how many transit sexual assault victims manage their distress in mixed-gender carriages by standing near other female passengers, creating 'bubbles' of women-only space. Spaces designated specifically for women mimic and formalize this strategy, assuring women of reliable access to transit that will not induce intense emotional distress.

Women-only transit should never be the only strategy for improving transit safety. It is imperative to work for a tomorrow where public transit is safe for people of all genders. Today, though, many women are suffering because they have already been harmed by a transit system that has not valued their safety. Planners have a duty to provide vulnerable people with access to transportation that does not require them to sacrifice their bodily autonomy and emotional wellbeing.

5.2. Limitations and future research

One strength of the qualitative component of this study, the ability to identify emergent findings, is also a limitation; the behaviors identified here as exclusive to victims were not measured quantitatively among a broader population. It is hoped that future researchers can build on these findings. Additional research on the experiences, concerns, and behavioral strategies of assault victims could provide clues as to how best to welcome them back into public transit and public space. For example, physical characteristics that increase women's sense of safety in isolated conditions have been identified (Loukaitou-Sideris, 2014); are there design elements that would increase assault victims' sense of safety in full transit vehicles?

6. Conclusions

Transit sexual assault is common in many transit systems, but little is known about its impacts on victims. This paper addresses that gap by examining the travel behaviors and experiences of transit sexual assault victims in comparison to those of other transit users. Transit sexual assault victims are more likely than other users to engage in defensive behaviors such as avoiding travel at certain times of day, traveling in groups, taking more expensive modes, or avoiding travel altogether.

Troublingly, emotional changes and behavioral adaptations identified by trauma researchers generally are observed among victims of transit sexual assault in particular. To manage the distress of reentering crowded transit after an assault, most victims attempt to create a safer space by engaging in defensive positioning. Women choose a location within the bus they perceive as safer, typically either up front near the driver, against a physical barrier such as a wall, or near other women or elderly people. Some victims also use objects as shields to insulate themselves or as potential weapons. These habitual behaviors allow some victims to carve out a safer-feeling space within a threatening transit environment, but others continue to struggle with hypervigilance, anxiety, and other consequences of trauma.

Many cities, including both cases included in this study, have yet to substantially address transit sexual assault. The misconception that transit sexual misconduct is primarily a 'nuisance' or a product of women's fearful imaginations is strongly refuted by the documentation of the frequency and full consequences of transit sexual assault presented here. Victims, primarily women, are being harmed. The violence to which they are exposed in the course of their daily travels is constricting their movement and reducing their quality of life. Planners can and must provide safer transit for people of all genders.

Addressing crime is often discussed in terms of prevention and punishment. Both these goals are valuable. However, our cities are full of women who have already been assaulted, are already traumatized, and who need additional help to recover their ability to move freely; it is important not to neglect our imperative to care for existing victims. Some strategies to improve victims' level of comfort, such as crowding reduction and more supportive responses to reports of assault, can serve the dual purpose of combatting

future crimes. Some strategies that may not substantially reduce assaults, such as women-only services, may nevertheless be worth considering as short-term methods of caring for victims.

Declarations of interest

None.

Financial disclosure

This work was supported by the Lee Schipper Memorial Scholarship, the World Resources Institute Ross Center for Sustainable Cities, and the Van Huyck Fellowship from the Department of City and Regional Planning at UNC Chapel Hill. The Secretaría de Movilidad Urbana Sostenible (SMMUS) of El Alto and TRANSMILENIO S.A. provided in-kind support for data collection.

Acknowledgments

The author would like to thank Daniel Rodriguez, Dario Hidalgo, Nichola Lowe, Nina Martin, Raleigh McCoy, Noreen McDonald, Paul Mihas, Ramon Muñoz-Raskin, Holger Dalkmann, Sam Zimmerman. Thanks also to the staffs of SMMUS, TRANSMILENIO S.A., the Secretariats of Mobility in Bogotá and Soacha, Colombia, and the volunteer leadership of the Federación de Juntas Vecinales of El Alto, Bolivia. Finally, thank you to the transit users who shared their time and experiences.

Appendix A. Selected Survey Questions

The following questions about transit safety were included as part of a longer survey about experiences with transit in general. Unless otherwise stated, question wording was the same in both countries.

For the following incidents, I would like to know if they have happened to you when taking public transportation in Bogotá or Soacha [Colombia version].

... El Alto or La Paz [Bolivia version]

1. INCIDENTS	Number of Incidents
<i>Instructions to enumerator: read (1) read each incident. (2) Ask "has this ever happened to you?" (3) If yes, ask "How many times?" (3b), if no, write "0".</i>	
Someone robbed you or tried to rob you in a bus or while you were waiting for a bus.	# attempts: # completed robberies:
You saw another passenger being robbed.	
A friend, relative, or someone else you know told you that someone robbed them on the bus.	
Women: Someone touched you inappropriately or assaulted you in the bus or station.	
Women: Someone touched you in a way that made you feel uncomfortable, but you didn't know if it was on purpose. (Colombia survey only)	
You saw someone touching a woman inappropriately (sexually) on a bus or in a station.	
A friend, relative, or other known person told you someone touched them inappropriately on a bus or in a station.	
2) If someone was trying to rob you, do you think the other passengers would help you? Y/N	
3) Colombia: In that situation, do you think the police or a TransMilenio employee would help you? 3) Bolivia: In that situation, do you think the driver or fare collector would help you?	
4) If a woman were being inappropriately touched in a bus or station, do you think the other passengers would help her? Y/N	
5) Colombia: In that situation, do you think the police or a TransMilenio employee would help her? 5) (Bolivia): In that situation, do you think the driver or fare collector would help her?	
6) During the last 30 days, due to the risk of crime, have you taken any of the following actions? (After reading each behavior, confirm if they have taken it or not. Select all that apply.)	
A. I avoided traveling at night.	_ Y _ N
B. I asked someone to accompany me on the bus.	_ Y _ N
C. I accompanied someone else on the bus.	_ Y _ N
D. I used a more expensive form of transportation. _ Y	_ N
E. I didn't make a trip that I wanted to make.	_ Y _ N
E1: If Yes: What would have been the purpose(s) of these trips? (select all that apply) Work, education, health, shopping, family obligations, entertainment, other (specify)	

Appendix B. Extended Interview Guide Excerpts

Extended interview participants were asked to comment on cards containing information such as statistics, quotations from earlier interviews, newspaper articles, and, for some topics, photographs. The guides contained modules on several topics; the modules about sexual assault are reproduced on the following pages. For interviews, the cards were printed on A4 cardstock, one card per page.

The cards were introduced by telling respondents that they would be shown some information from earlier in the study, and that we were interested in their opinions about it. For example, did they find anything surprising, have they experienced something similar, did they disagree with the opinion being expressed, did they find the information trustworthy, etc. At the end, they would be asked which cards would be most useful to explain the problem to another person.

Participants were shown one card at a time, and either read them aloud or had them read to them, depending on the participant's preference. Most respondents gave reactions to the cards without further prompting. Follow-up questions were asked as appropriate.

By design, the guides evolved over the course of the study; earlier interviews provided additional material to which later interviewees could react. The versions shown here are the final versions used.

Appendix D. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.jth.2019.04.004>.

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