

Navigating Safety: Security Concerns in College Student Transportation in Algiers



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<https://doi.org/10.18280/ijssse.140619>

ABSTRACT

Received: 17 October 2024

Revised: 12 December 2024

Accepted: 20 December 2024

Available online: 31 December 2024

Keywords:

college student transportation, security satisfaction, public transportation safety, multimodal transportation, student mobility

This study investigates the security concerns of college students commuting in Algiers, focusing on how these interconnected issues impact their safety satisfaction. Utilizing a mixed-methods approach, the research combines quantitative data from a survey of 434 students with qualitative insights from in-depth interviews with 120 students. The findings reveal significant dissatisfaction with the safety of public transportation, particularly buses, trains, and tramways, due to interconnected issues like overcrowding, harassment, and theft, rooted in systemic failures such as inadequate monitoring and poor infrastructure. Comfort satisfaction emerged as a key factor influencing overall safety perceptions, with COUS (student buses) associated with higher safety satisfaction compared to other modes. Demographic factors like gender and age had minimal impact on safety satisfaction, though qualitative data highlighted the pervasive nature of harassment, especially for female students. The study recommends enhancing surveillance systems, increasing the frequency of transport services, and implementing gender-specific safety measures. While certain recommendations, like mobile apps and awareness campaigns, are immediately feasible, more systemic changes, such as infrastructure upgrades, may face financial and bureaucratic challenges. This research contributes to the literature on urban transportation safety and provides practical recommendations for improving the commuting experience for college students in Algiers.

1. INTRODUCTION

The research adopts a multidisciplinary framework, incorporating insights from social sciences to explore how transportation security issues affect the behavior and well-being of college students. By examining both qualitative and quantitative data, the study highlights the significant interplay between human behavior and transportation safety, providing comprehensive insights for policymakers and transport authorities.

The safety and security of college students during their daily commutes is a critical aspect of urban transportation planning. This study aims to understand the security challenges faced by students at the University of Algiers, identifying factors that influence their security satisfaction and providing insights for enhancing transportation safety. By examining both quantitative and qualitative data, this research contributes significantly to the literature on urban transportation security and offers practical recommendations for improving student safety.

College students often rely on public transportation, making them vulnerable to issues such as harassment, theft, and overcrowding. Previous studies have highlighted these concerns in various contexts, but there is a lack of research specifically addressing the unique socio-economic and

infrastructural conditions of Algiers. This study fills this gap by exploring the specific challenges faced by students in Algiers, considering cultural and infrastructural contexts that influence their mobility.

Passenger safety is a crucial factor influencing public transport satisfaction. Studies show that only 10% of individuals use public transport if they feel unsafe, as safety perceptions directly impact their transport choices. Ensuring safety on public transport is more important than addressing crime rates, as it can also reduce traffic accidents. Additionally, the efficiency and smooth operation of public transport are essential components of overall passenger satisfaction [1].

Women's safety in public transport is a major global challenge. Various measures are being taken by authorities to make public transport safe and convenient for women [2]. Ensuring passenger safety is essential to public transport satisfaction [1]. Research shows that safety concerns influence public transport usage [3]. Public transport safety is crucial due to its affordability and low private car ownership in many countries [4].

Gender is one of the strongest predictors of feeling safe in public spaces, with women reporting higher rates of fear and avoidance behaviors. Moreover, women aged 18–24 are significantly more likely to experience sexual violence, impacting their perception of safety [5].

This study seeks to answer the two research questions:

- (1) How do demographic factors and transportation modes impact security satisfaction among college students in Algiers?
- (2) What factors influence security in students' daily commutes?

To address this question, the research objectives are twofold:

Analyze the Impact of Demographic Factors: The study examines how variables such as commune (residential area), gender, and age influence students' perceptions of security during their commutes.

Evaluate the Role of Transportation Modes: The research evaluates the impact of different modes of transportation—including bus, subway, train, walking, COUS (student buses), tram, car, and taxi—on security satisfaction among college students.

To achieve these objectives, a mixed-methods approach was employed. This included:

Quantitative Analysis: A questionnaire survey was conducted with 434 students from various communes in Algiers. This survey collected data on students' demographic information, transportation habits, and security satisfaction.

Qualitative Analysis: In-depth interviews were conducted with 120 students to gain deeper insights into their personal experiences and perceptions of security during their daily commutes.

The combination of these methods provides a comprehensive understanding of the security issues faced by college students in Algiers, enabling the identification of key concerns and the development of targeted interventions to enhance transportation safety.

The findings of this study resonate with existing research on public transportation safety while highlighting unique regional challenges. Similar to studies conducted in Dhaka, Bangladesh [6] and Lagos, Nigeria [7], which emphasize overcrowding, theft, and harassment as significant safety concerns for transit users, this research underscores these issues within the specific socio-cultural and infrastructural context of Algiers. However, unlike these studies, this paper uniquely investigates the safety satisfaction of college students—a demographic often overlooked in urban mobility studies.

Moreover, the integration of both quantitative and qualitative methods enables a deeper exploration of nuanced issues, such as gender-specific safety concerns, aligning with global research that emphasizes the vulnerability of women in public transport [8]. While Western studies often suggest technological interventions like real-time monitoring systems [9], this research sheds light on the practical challenges of implementing such measures in developing contexts like Algeria.

The article begins with a Methodology section outlining the research approach, including questionnaires, interviews, and data analysis. The Literature Review follows, summarizing relevant studies. In addition, the Results section presents findings from both the questionnaire and interviews, focusing on safety perceptions, interconnected challenges, root causes of unsafe and unethical behaviors during students' daily commutes, and the coping strategies employed by students. These insights, coupled with recommendations from students, form the basis for the analysis. The Discussion analyzes the impact of demographic factors and transportation modes on security satisfaction, along with factors influencing security in students' daily commutes. The article offers Recommendations based on the findings, followed by a Conclusion summarizing the key insights.

2. METHODOLOGY

This study used a mixed-methods approach to analyze how demographic factors and transportation modes impact security satisfaction among college students in Algiers.

2.1 Questionnaire survey

- **Participants:** A sample of 434 students from various communes in Algiers, selected to represent diverse demographics. The sampling strategy for this study involved the direct administration of a questionnaire to a randomly selected group of 800 students at the University of Algiers. Efforts were made to ensure equal representation of both genders during the selection process. From the initial survey, 434 valid responses were obtained after eliminating incomplete questionnaires, ensuring that the final sample accurately represented the targeted student population.
- **Instrument:** A structured questionnaire collected data on transportation habits, security satisfaction, and perceptions of different transportation modes.
- **Distribution:** Questionnaires were distributed to 800 students, with 434 valid responses included in the analysis.
- **Data Collected:** Focused on demographic information, transportation modes used, and security concerns.

2.2 Interviews

- **Participants:** 120 students were interviewed to gain deeper insights into their security experiences during commutes.
- **Interview Guide:** Semi-structured interviews focused on harassment, theft, overcrowding, and behavior of transport workers and passengers.
- **Data Collection:** Interviews were conducted anonymously, with detailed notes taken instead of recordings.

2.3 Data analysis

- **Quantitative Analysis:** Descriptive statistics and two regression models were used to assess the impact of demographic factors and transportation modes on security satisfaction. The first model included only demographic variables (commune, gender, age), while the second model incorporated both demographic variables and transportation modes (bus, COUS, taxi, subway, tram, walking, train, car), along with a variable for comfort satisfaction.
- **Qualitative Analysis:** Thematic analysis of interview data identified recurring themes, which were integrated with quantitative findings for a comprehensive understanding.

2.4 Ethical considerations

- **Informed Consent:** Participants were fully informed about the study and their rights.
- **Confidentiality:** Responses were anonymized, and data was securely stored to protect privacy.

3. LITERATURE REVIEW

The safety and security of college students' mobility are crucial aspects of urban transport planning. This literature review synthesizes existing research to explore diverse challenges and proposed solutions related to college students' transportation, with a particular focus on safety and security. The selected studies are geographically relevant or focus on populations similar to those in Algiers, providing a foundation for this study's comprehensive analysis of security satisfaction among college students in Algiers.

3.1 Perceptions and challenges in public transit

Research on public transit services in Dhaka [10] and Guangzhou [11] revealed significant issues related to poor service and safety concerns, highlighting the importance of understanding students' perceptions to improve transit satisfaction and ridership. These studies emphasize the need for effective public transport management, particularly in addressing overcrowding and safety.

While these studies highlight general public transit issues, they do not specifically address the unique socio-economic and infrastructural conditions of Arab developed countries. This study fills this gap by focusing on the specific challenges faced by college students in Algiers.

3.2 Safety and victimization

Sexual harassment and victimization in public transport are critical concerns addressed in studies from the USA [12] and globally [13, 14]. These studies suggest preventive measures to enhance safety, offering comprehensive analyses of harassment incidents and strategies for creating safer transit environments.

Recent studies have applied advanced modeling techniques to predict and analyze road traffic accidents. Jin et al. [15] utilized grey system theory for accident prediction, while Adeliyi et al. [16] employed a pruned tree-based model to assess accident severity. These approaches provide a foundation for understanding transportation safety dynamics, which this study builds upon by focusing specifically on public transportation safety perceptions among college students in Algiers.

While these studies highlight the prevalence of harassment, they focus mainly on Western contexts. There is a notable gap in research on how cultural differences in non-Western countries like Algeria affect the incidence and perception of harassment. This study addresses this gap by examining the safety and victimization experiences of college students in Algiers, considering local cultural and societal norms.

3.3 Technological interventions

Technological solutions, such as real-time monitoring systems using IoT and Arduino, have been proposed to improve the punctuality and safety of college transport systems [17, 18]. These interventions show promise in enhancing the safety and reliability of student transport.

Although technological interventions are beneficial, their implementation in developing countries like Algeria can face significant challenges, such as limited infrastructure and financial resources. This study will consider these challenges while exploring potential technological solutions to improve security satisfaction in Algiers.

3.4 Impact of external factors

The influence of external factors on student mobility has been explored in studies examining how exposure to violent crime affects school attendance [19] and specific safety concerns in Lagos [20]. These studies highlight the broader environmental factors impacting student mobility.

While these studies overview the external factors, they do not specifically address the localized challenges in a metropolitan city like Algiers. This research investigates the impact of similar external factors, such as infrastructure quality, on the mobility of college students in Algiers, contributing to a more nuanced understanding of the local context.

3.5 Socioeconomic and gender perspectives

Transportation challenges from socioeconomic and gender perspectives have been extensively studied, with research in Bangladesh addressing the lack of safe transportation for female students [6] and the social alienation caused by private transport [7].

These studies highlight significant gender and socioeconomic issues, primarily in South Asian contexts. This study addresses the gap by exploring how gender and age influence the perception of safety among college students in Algiers, considering local cultural conditions.

3.6 Behavioral insights

Understanding the behavioral aspects of student mobility is crucial for developing effective transport strategies. Studies analyzing students' perceptions, preferences, and satisfaction levels with transit services [8] and the influence of safety perceptions on transit use [9] have highlighted the importance of addressing these factors to improve service delivery.

While these studies are important, there is a lack of research focusing on behavioral aspects in the North African context. This study fills this gap by examining the safety perceptions of college students in Algiers, particularly how their behavior is influenced by security concerns during their commutes.

The reviewed literature underscores the multifaceted challenges associated with college students' mobility, particularly in the context of safety and security. Addressing these challenges requires a comprehensive understanding of student perceptions, the implementation of technological solutions, and consideration of socioeconomic and gender-specific issues. By focusing on these aspects, this study contributes to the existing body of knowledge, providing a detailed analysis of the safety and security of college students' mobility in Algiers, and addressing the identified gaps in the literature.

While existing studies provide valuable insights into public transportation safety, significant gaps remain that this study aims to address. First, much of the current research focuses on general populations or specific urban contexts, with limited attention given to the unique challenges college students face. This study bridges that gap by exploring the commuting experiences of students in Algiers, a demographic particularly vulnerable to safety concerns due to their reliance on public transport.

Second, the influence of cultural and socio-economic factors on safety perceptions is underexplored in non-Western and developing countries. Situating this research within the

Algerian context captures how local norms and systemic infrastructural issues shape safety satisfaction. Additionally, while technological interventions are often proposed as solutions, the feasibility and practicality of these measures in resource-limited settings like Algiers remain insufficiently addressed.

Finally, most existing studies lack an integrative approach combining quantitative and qualitative methods, limiting the depth of their findings. This study adopts a mixed-methods framework to provide a comprehensive analysis, capturing measurable trends and lived experiences. These contributions fill critical gaps in the literature and offer actionable insights for policymakers and transport authorities in Algeria and similar contexts.

4. RESULTS

4.1 Questionnaire

4.1.1 Overview of study participants

Demographic characteristics

Table 1 shows that the study's participants were predominantly female (63.4%) and mainly within the 17-24 age range (93.5%).

Table 1. Gender and age distribution

	Sex	Age
Females	63.4%	17-24 93.5%
Males	36.6%	25-30 6.5%

Table 2. Province of residence

Province	Percentage (%)	Province	Percentage (%)
Alger-Centre	5.3	Ouled Fayet	1.2
Bab Ezzouar	5.3	Baba Hassen	1.2
Reghaïa	4.8	Boumerdes	1.2
Kouba	4.4	Aïn Taya	0.9
El Biar	4.4	Cheraga	0.9
Les Eucalyptus	4.4	Baraki	0.9
Draria	3.7	Hydra	0.9
El Harrach	3.2	Bir Mourad Raïs	0.7
Hussein Dey	3.0	Beni Messous	0.7
Bordj El Kiffan	3.0	Baba Ali	0.7
El Achour	3.0	Bouira	0.7
Bouzareah	3.0	Raïs Hamidou	0.5
Oued Smar	2.8	Mahelma	0.5
Dely Ibrahim	2.8	H'raoua	0.5
Aïn Benian	2.8	Staoueli	0.5
Zeralda	2.5	Souidania	0.5
Rouïba	2.5	El Hammamet	0.5
Birtouta	2.5	Saoula	0.5
Djasr Kasentina	2.3	Sidi Abdellah	0.5
Bordj El Bahri	2.3	Casbah	0.5
Ben Aknoun	2.3	El Madania	0.2
Sidi M'Hamed	2.1	Kolea	0.2
Belouizdad	1.8	Bougie	0.2
Dar El Beïda	1.8	Lakhdaria	0.2
Birkhadem	1.8	Bourouba	0.2
Bab El Oued	1.6	Chevalley	0.2
Mohammadia	1.6	Khraicia	0.2
Douera	1.4	Blida	0.2
Bachdjerrah	1.4	El Mouradia	0.2

Additionally, Table 2 reveals that the highest representation is from the Algiers-Center and Bab Ezzouar provinces, each accounting for 5.3% of the surveyed students. Several other communes, such as Reghaïa, Kouba, and El Biar, represent 3% to 4.8%. Conversely, the other cities, including Bouira and Blida, have the lowest representation, at 0.2%. The distribution highlights a diversity of student residential locations, with a greater concentration from the central communes of Algiers.

Tables 3 and 4 show that the bus is the most commonly used mode of transportation among students (64.3%), followed by COUS buses (33.6%) and cars (31.3%). In addition, the majority of students (65.21%) are multimodal, with 28.11% using multimodal transport with COUS and 37.10% using

other combinations. Mono-modal students represent 34.79%, with the bus being the most frequently used mode (11.98%).

Table 3. Utilized PT means of students

Mode of Transportation	Percentage (%)
Bus	64.3%
Cous	33.6%
Car	31.3%
Taxi	13.8%
Subway	25.1%
Tramway	9.0%
Cable Car	0.2%
Walking	19.4%
Train	17.5%

Table 4. Transportation categories of students

Category		Percentage (%)	
Mono-modal students	34.79%	Bus	11.98%
		COUS	5.53%
		Train	5.53%
		Subway	5.76%
		Car	4.15%
		Pedestrians	1.61%
Multimodal students	65.21%	Multimodal transport with	28.11%
		COUS	37.10%
		Others	17.74%
		Multimodal pedestrians	

4.1.2 General perceptions of safety

Most students (62.67%) are not satisfied with their safety, while 37.33% reported satisfaction with their safety.

Tables 5 and 6 show that most students identified buses (79.26%) and trains (59.68%) as the modes of transportation with the most significant security problems. Additionally, 17.28% of students think that buses are the only mode of transportation with security problems, while smaller percentages noted issues exclusively with trains (9.22%).

Table 5. Modes of transportation that have security problems (%)

Bus	COUS	Taxi	Subway	Tramway	Walking	Train
79.26	28.57	3.46	11.99	29.49	30.41	59.68

Table 6. Students who think just one means of transportation has security problems (%)

Bus	COUS	Taxi	Subway	Tramway	Walking	Train
17.28	1.61	00	0.23	1.61	1.38	9.22

4.1.3 Impact of demographic factors on safety perceptions

Gender differences

The Regression 01 analysis shows that the gender code has a non-significant negative impact on safety satisfaction, with a standardized coefficient (Beta) of -0.051 and a significance value (Sig) of 0.292. This indicates that gender, in this model, is not a significant predictor of safety satisfaction among the students.

The results suggest that, within the context of this study, gender does not have a statistically significant effect on safety perceptions. Although there is a slight negative association, it is not strong enough to be considered meaningful. This could imply that both male and female students have similar levels of safety satisfaction, or that other factors may be more influential in determining safety perceptions.

Age differences

The Regression 01 analysis shows that age has a non-significant negative impact on safety satisfaction, with a standardized coefficient (Beta) of -0.060 and a significance value (Sig) of 0.213. This indicates that age is also not a significant predictor of safety satisfaction in this model.

The analysis suggests that age does not significantly affect students' safety perceptions. The negative coefficient indicates that older students might feel slightly less safe, but this effect is not statistically significant. Thus, age alone does not appear to be a decisive factor in influencing how safe students feel during their commutes.

Province of residence

The Regression 01 analysis shows that the province has a significant negative impact on safety satisfaction, with a standardized coefficient (Beta) of -0.132 and a significance value (Sig) of 0.006. This suggests that the location of residence is a significant predictor of safety satisfaction among students.

The significant negative association indicates that students from certain communes feel less safe compared to others. This finding could reflect differences in the quality of transportation infrastructure, security measures, or social environments across different areas. Addressing these disparities could be crucial for improving overall safety satisfaction among students from various communities.

4.1.4 Impact of transportation modes on safety perceptions

Summary of key findings from Regression 02 analysis

- **Bus:** The regression analysis shows that the bus mode has a non-significant negative impact on safety satisfaction, with a standardized coefficient (Beta) of -0.037 and a significance value (Sig) of 0.431. This suggests that using the bus does not significantly influence safety perceptions.
- **Subway:** The subway mode has a non-significant positive impact on safety satisfaction, with a standardized coefficient (Beta) of 0.047 and a significance value (Sig) of 0.332. This indicates that subway usage does not significantly affect students' safety perceptions.
- **Train:** The training mode also shows a non-significant negative impact on safety satisfaction, with a standardized coefficient (Beta) of -0.066 and a significance value (Sig) of 0.182, suggesting no strong influence on safety perceptions.
- **Walking:** Walking shows a non-significant negative impact on safety satisfaction, with a standardized coefficient (Beta) of -0.078 and a significance value (Sig) of 0.274, indicating that walking does not significantly influence safety satisfaction.
- **COUS (Student Bus Service):** The COUS bus mode has a significant positive impact on safety satisfaction, with a standardized coefficient (Beta) of 0.114 and a significance value (Sig) of 0.015. This suggests that students using COUS buses perceive higher safety satisfaction compared to other modes.
- **Tramway:** The tramway mode shows a non-significant positive impact on safety satisfaction, with a standardized coefficient (Beta) of 0.073 and a significance value (Sig) of 0.318, indicating no significant effect on safety perceptions.
- **Car:** The car mode has a non-significant positive impact on safety satisfaction, with a standardized coefficient (Beta) of 0.049 and a significance value (Sig) of 0.497, suggesting that driving a car does not significantly influence safety perceptions.
- **Taxi:** The taxi mode shows a non-significant negative impact on safety satisfaction, with a standardized coefficient (Beta) of -0.020 and a significance value (Sig) of 0.805, indicating that using taxis does not significantly affect safety satisfaction.
- **Comfort Satisfaction:** Comfort satisfaction has a strong positive impact on safety satisfaction, with a standardized coefficient (Beta) of 0.381 and a significance value (Sig) of 0.000. This suggests that

higher comfort levels are strongly associated with higher safety satisfaction.

Interpretation of the impact of transportation modes on safety perceptions

- The analysis reveals that most transportation modes (bus, subway, train, walking, tramway, car, and taxi) do not have a statistically significant impact on students' safety perceptions. This suggests that students' feelings of safety are not strongly influenced by the mode of transport they use, except for COUS buses, which are associated with higher safety satisfaction.
- The significant positive impact of comfort satisfaction on safety perceptions indicates that the overall comfort of the transportation experience plays a crucial role in how safe students feel. Therefore, improving comfort in public transportation could be a key strategy for enhancing safety satisfaction among students.

4.1.5 Comparison between the impact of demographic factors in Regression 01 vs. Regression 02

Overview: The analysis compared the influence of demographic factors (commune of residence, gender, age) on safety satisfaction in two regression models. Regression 01 included only demographic factors, while Regression 02 added transportation modes to the analysis.

Province of residence

- Regression 01: The province of residence significantly impacted safety satisfaction ($\text{Beta}=-0.132$, $\text{Sig}=0.006$), suggesting that students' safety perceptions varied depending on where they lived.

- Regression 02: When transportation modes were included, the commune's impact became non-significant ($\text{Beta}=-0.034$, $\text{Sig}=0.495$). This indicates that the earlier significance was likely tied to the types of transportation associated with specific communes rather than the location itself.

Interpretation: The inclusion of transportation modes in Regression 02 shows that perceived safety issues linked to certain communes may be more about the transportation options available in those areas rather than the geographic location alone.

Gender

- Regression 01: Gender did not significantly affect safety satisfaction ($\text{Beta}=-0.051$, $\text{Sig}=0.292$), indicating no strong gender-based differences in safety perceptions.

- Regression 02: Gender remained non-significant but had a slightly more negative impact ($\text{Beta}=-0.097$, $\text{Sig}=0.036$) where female students feel safer than male students. This suggests that gender differences in safety perceptions may be partially influenced by the transportation modes used.

Interpretation: While gender alone does not strongly influence safety satisfaction, the introduction of transportation modes in Regression 02 hints at possible interactions, where transportation experiences might contribute to subtle gender differences in safety perceptions.

Age

- Regression 01: Age was not a significant predictor of safety satisfaction ($\text{Beta}=-0.060$, $\text{Sig}=0.213$), indicating that age did not play a crucial role in shaping safety perceptions.

- Regression 02: The impact of age further diminished with the inclusion of transportation modes ($\text{Beta}=-0.018$,

$\text{Sig}=0.682$), reinforcing the lack of a significant relationship between age and safety perceptions.

Interpretation: Age consistently showed minimal impact on safety satisfaction in both models, and its influence was further reduced when transportation modes were considered, suggesting that age is not a significant factor in determining how safe students feel.

Summary of comparison

The shift in significance from Regression 01 to Regression 02 highlights the critical role of transportation modes in shaping safety perceptions. The significance of the province of residence in Regression 01 diminishes when transportation modes are considered, suggesting that transportation choices, rather than the location itself, are more influential in safety satisfaction. Gender's slight shift in significance in Regression 02 suggests possible interactions with transportation experiences, while age remains consistently non-influential across both models.

4.2 Interview results

4.2.1 In-depth safety concerns

Harassment and inappropriate behaviour

Harassment emerged as a significant issue during the interviews. One female student shared, "There is perverted behaviour from old men in COUS buses. This has happened to me and my friends several times in COUS and private buses."

Theft and security absence

A concerning issue highlighted by several students was the absence of security across transportation systems. One student reported, "There is a total absence of security in all the transport systems of Algiers. Especially thefts; I lost my phone while getting on a tramway, and I know a friend who lost her phone while getting on a COUS bus, which is supposed to be the safest means of transportation for students." Another added, "At COUS buses, there is no passenger control, leading to the boarding of people involved in criminal activities, individuals unrelated to higher education."

Overcrowding

Overcrowding was consistently mentioned as a major issue. A student explained, "There is a lack of an adequate number of buses compared to the number of students, which causes overcrowding all the time." This issue is often exacerbated during peak hours, leading to discomfort and heightened safety concerns.

Sexual harassment

Sexual harassment, particularly in overcrowded conditions, was a common concern among female students. One student recounted, "One time I was in a COUS bus, it was very overcrowded. I was stuck with many girls near the door, and there was no personal space. I didn't realize until I got out that the person behind me was a man. He was hugging me, and I thought he was a girl. I was so uncomfortable; I felt violated. That's sexual harassment in capital words."

Behaviour of public transportation workers and passengers

Another issue raised was the behaviour of bus drivers and passengers. A student noted, "Some bus drivers drive recklessly, and the conductors overcrowd the buses. They walk through the crowded bus, pressing against women. I feel violated; he can wait for people to get off and then take his money." Another student described the problematic behaviour on tramways, where overcrowding often leads to dangerous

situations, with men pushing against doors and vehicles obstructing tramway lanes.

General feeling of insecurity

Many students expressed a general feeling of insecurity during their commutes. One student stated, "There is no security on trains, buses, and COUS buses. We're alive because of a miracle. Even students in COUS buses, where there are no strangers, get into fights sometimes. I think it's because of their daily fatigue during the commute, especially in the morning."

Systematic issues in transportation

Systematic issues within the transportation system were also mentioned. A student observed, "In the morning, bus workers sometimes don't have change, and passengers don't either. This small issue starts fights. It's the workers' job to have change and to be respectful to customers. If transportation cards existed for the entire system, problems like this wouldn't happen."

Behaviour of taxi drivers

The behaviour of taxi drivers was a recurrent concern. A student reported, "Taxi drivers are the weirdest. They don't stop for people, and even if they do, they don't take you if they don't want to. They also don't use the meter and charge whatever they want, which is illegal. Some of them are not respectful and are always angry."

Positive experiences in the subway system

A small proportion of students mentioned feeling safer in the subway system. One student commented, "In subways, I feel safer than any other means of transportation because there are cameras everywhere and police officers all the time. I just dislike the overcrowding during peak hours, especially in the morning."

4.2.2 Interconnected safety challenges

- **Overcrowding and Harassment:** Overcrowding increases opportunities for harassment and sexual harassment, as it is difficult for individuals to avoid unwanted contact in crowded spaces.
- **Lack of Security and Theft:** The absence of security and passenger control increases the likelihood of theft and harassment.
- **Overcrowding and Unsafe Behaviors:** Overcrowding fosters reckless behavior from passengers and drivers due to increased tension and pressure.
- **General Insecurity and Systemic Issues:** Systemic problems such as insufficient buses and poor infrastructure lead to overcrowding, which increases theft, harassment, and unsafe behaviors, further exacerbating feelings of insecurity.
- **Taxi Driver Behavior and Insecurity:** The unpredictable behavior of taxi drivers contributes to student insecurity and frustration.
- **Positive Experiences in the Subway System:** Students feel safer in the subway due to security cameras and police presence, contrasting with the insecurity in other transportation modes.

4.2.3 Root causes of unsafe and unethical behaviors in students' daily commute

Harassment and sexual harassment

- **Lack of Enforcement:** The absence of security and monitoring allows harassment to occur without consequences.
- **Cultural Norms:** Deep-rooted gender attitudes and

objectification contribute to inappropriate behavior, especially in crowded spaces.

- **Overcrowding:** Cramped conditions create anonymity and opportunities for perpetrators to harass others.

Behavior of taxi drivers

- **Lack of Regulation:** Weak enforcement allows drivers to overcharge and mistreat passengers without repercussions.
- **Economic Pressures:** Financial strain leads drivers to prioritize profit, resulting in dismissive or aggressive behavior.
- **Power Dynamics:** Drivers feel empowered to act unethically due to the control they have over picking and dropping off passengers.

Theft

- **Lack of Security:** Without security personnel, thieves feel emboldened to target passengers.
- **Overcrowding:** Crowded spaces make it easy for theft to occur undetected.
- **Socioeconomic Factors:** Poverty and unemployment drive individuals to theft in public transport systems.

Reckless behavior of drivers

- **Schedule Pressure:** Drivers feel pressured to stay on time, leading to reckless driving.
- **Lack of Training:** Insufficient training and oversight lead to careless behavior.
- **Overcrowding Stress:** Managing large crowds causes frustration, resulting in unsafe driving practices.

4.2.4 Coping strategies

Personal safety practices

Some students have developed personal safety practices to navigate their commute. A female student noted that during winter, her father or brother walks her to the bus stop because she leaves the house at 6 AM. Another male student mentioned avoiding the use of his phone in empty pedestrian areas to reduce the risk of theft.

Use of technology

Technology also plays a role in how students cope with safety concerns. One female student shares her location with her father when using taxis. Another student calls her father or brother if she feels unsafe with a taxi driver. A student mentioned pretending to be on a call and stating her exact location out loud when she felt uncomfortable with a taxi driver. Another student highlighted that she prefers using the Yassir app because it tracks the location of the car, which makes her feel safer.

4.2.5 Recommendations from students

- Implement stricter controls to prevent non-students from boarding COUS buses.
- Increase the number of COUS buses, particularly to underserved provinces.
- Assign control workers to monitor COUS buses during rides.
- Install cameras in COUS buses for enhanced security.
- Introduce COUS bus services for provinces currently without them.
- Increase the frequency of tramway services during peak morning hours to reduce overcrowding.
- Deploy police officers in areas known for security issues to enhance student safety.

4.3 Summary of key findings

4.3.1 Integration of quantitative and qualitative data

The results from the questionnaire and interviews provide a comprehensive understanding of the safety concerns among college students in Algiers. The quantitative data outlines general trends in safety satisfaction, while the qualitative interviews reveal detailed personal experiences that contextualize these trends.

Alignment and differences

- **Quantitative Insights:** The majority of students expressed dissatisfaction with their safety, particularly when using buses and trains. Demographic factors such as gender and age showed minimal influence on safety perceptions, while the commune of residence initially appeared significant but lost importance when transportation modes were considered. Comfort was identified as a key factor influencing safety satisfaction, with COUS buses associated with higher safety satisfaction.

- **Qualitative Insights:** Interviews highlighted harassment, overcrowding, and the lack of security as major concerns. The qualitative data also emphasized systemic issues such as the behavior of public transportation workers and inadequacies in the transportation system, which were not fully captured in the quantitative analysis.

Key findings

- **Overcrowding:** Both data sets identified overcrowding as a critical issue affecting students' safety perceptions across various transportation modes, particularly buses and COUS buses.

- **Harassment:** The qualitative data revealed that harassment, especially in overcrowded conditions, is a significant problem that contributes to feelings of insecurity—an issue not as explicitly captured in the quantitative analysis.

- **Comfort:** The quantitative data underscored the importance of comfort in determining safety satisfaction, a finding supported by students' qualitative reports of discomfort and insecurity due to overcrowded and poorly managed transportation.

- **Systemic Issues:** Interviews brought to light systemic and behavioral issues within the transportation infrastructure, including the conduct of transportation workers and inadequate security measures, which play a significant role in shaping safety perceptions.

In conclusion, integrating the quantitative and qualitative findings highlights the complex nature of transportation safety concerns. While quantitative data identifies broad patterns, qualitative insights provide depth, revealing underlying issues such as harassment, systemic failures, and the critical role of comfort in safety perceptions. Addressing these issues requires targeted interventions to reduce overcrowding, enhance security, and improve overall transportation conditions.

5. DISCUSSION

This discussion focuses on the key findings related to security satisfaction among college students in Algiers, examining how various factors influence their perceptions of safety during daily commutes. By integrating both quantitative and qualitative data, the discussion provides a comprehensive interpretation of the results.

5.1 Impact of demographic factors and transportation modes on security satisfaction

5.1.1 Demographic factors

The analysis revealed that demographic factors, specifically gender and age, had minimal influence on security satisfaction among students. Neither gender nor age emerged as significant predictors in the regression analysis, indicating that safety concerns are widespread and not strongly tied to these demographic characteristics.

5.1.2 Transportation modes

Transportation modes, on the other hand, played a more significant role. The regression analysis highlighted that COUS buses were associated with higher safety satisfaction compared to other modes. This suggests that students perceive COUS buses as safer, likely due to their exclusive use by students. Other modes, such as public buses and trains, did not significantly affect safety satisfaction, likely due to issues such as overcrowding and inadequate security measures that negate their potential benefits.

5.2 Factors influencing security in students' daily commutes

5.2.1 Harassment and inappropriate behavior

Gender significantly impacts security satisfaction, especially for female students who experience frequent harassment. Addressing gender-based harassment, particularly in overcrowded conditions, is essential for a safer commute.

5.2.2 Theft and absence of security measures

Lack of adequate security measures (e.g., surveillance, screening) leaves students vulnerable to theft. Implementing robust security measures is crucial to improving safety in public transportation.

5.2.3 Overcrowding

Overcrowding significantly reduces security satisfaction. Managing passenger volumes and increasing transport service frequency is key to alleviating overcrowding and enhancing safety.

5.2.4 Behavioral issues

Issues like reckless behavior by transport workers and conflicts among passengers negatively impact security. Training and monitoring transport workers, along with promoting proper passenger etiquette, can improve safety.

5.2.5 Demographic and transportation mode factors

- **Gender:** Female students report higher security satisfaction, indicating a need for gender-specific safety measures.
- **Age:** Age does not significantly affect security satisfaction.
- **Transportation Modes:**
 - **COUS Bus:** Positively associated with higher security satisfaction, indicating a safer environment.
 - **Bus, Taxi, Train, Walking, Tramway:** Generally associated with lower security satisfaction due to issues like overcrowding and inadequate security.
 - **Subway:** Associated with higher security satisfaction, likely due to better security measures.

- Car: Slightly higher security satisfaction, but not significant.

5.3 Implications for policy and practice

This puts important implications of the findings on transportation policy and urban planning in Algiers. There is a strong feeling of discontent towards safety, which puts up an instant requirement for interventions such as extended surveillance systems including cameras and security personnel to harassment and theft. Safety can also be perceived by the transport service quality through better seating, maintenance, and increasing service frequency. Those include gender-based measures: women-only compartments and sensitizing the community through awareness campaigns, to reduce harassment and increase the safety of female students.

Integrating technology, such as mobile apps for real-time monitoring and reporting, can empower passengers and improve response times while interventions need to be cost-effective given the financial constraints of Algiers. Addressing overcrowding by increasing bus and train frequency during peak hours, and improving route planning, is critical to safety and comfort. Similarly, investments are needed in infrastructure, such as pedestrian pathways and multimodal connections to universities, for safer commutes. A collaborative approach among transport providers, universities, and local authorities is crucial to address systemic, behavioral, and infrastructural factors that create a safer and more comfortable environment for students and vulnerable populations.

5.4 Recommendations

5.4.1 Address overcrowding

- Increase the frequency of buses and trams during peak hours to reduce overcrowding and enhance safety.
- Implement real-time tracking systems to manage and distribute passenger loads effectively.

5.4.2 Enhance security measures

- Install surveillance systems like CCTV in buses, COUS buses, and trains to deter theft and harassment.
- Increase the presence of security personnel during peak hours and in high-risk areas.

5.4.3 Improve worker training

- Mandatory training programs for transportation workers focusing on respectful behavior, customer service, and safety protocols.
- Regular assessments and refresher courses to maintain high standards of conduct.

5.4.4 Policy interventions

- Develop targeted policies for safety concerns, including women-only sections in transportation, increased lighting, and emergency contact points.
- Collaborative efforts between government, transportation authorities, and educational institutions for effective policy implementation.

5.4.5 Improve transportation infrastructure

- Invest in maintenance and upgrades of existing transportation facilities to meet safety standards.

- Expand public transportation networks to underserved areas and enhance pedestrian pathways around transit points.

5.4.6 Implement technological solutions

- Introduce a unified transportation card system to streamline transactions and reduce conflicts.
- Develop mobile apps for real-time information on schedules, overcrowding, and security incidents, and use data analytics for resource allocation and service improvements.

Implementing these recommendations in real life in Algiers presents challenges due to financial constraints, bureaucratic inefficiencies, and socio-political factors. However, the most immediately applicable recommendations are developing mobile apps to provide real-time information, improve resource allocation, and create awareness campaigns to promote social responsibility. These campaigns could focus on reminding men that women in public spaces are wives, daughters, and mothers, fostering a culture of respect and reducing harassment. These approaches require relatively lower financial investment and can positively impact behavior and safety in the short term.

6. CONCLUSIONS

This study analyzes the security concerns of college students in Algiers during their daily commutes, highlighting issues like overcrowding, harassment, and inadequate security measures, particularly on buses and trains. It makes a significant contribution to the existing body of knowledge by addressing the specific challenges faced by college students in Algiers, a demographic often overlooked in transportation research. Combining quantitative data with qualitative insights, provides a nuanced understanding of safety concerns, highlighting both measurable trends and personal experiences. The study uniquely contextualizes gender-specific safety issues within Algiers' cultural and infrastructural framework, offering a valuable addition to global discussions on mobility and safety. Furthermore, it delivers actionable recommendations for policymakers and transport authorities, tailored to the socio-economic realities of the region. By bridging local insights with global transportation safety literature, this research not only fills critical gaps but also offers practical solutions to enhance the commuting experience for students in similar contexts.

The findings reveal that these issues are deeply interconnected, with overcrowding exacerbating problems such as harassment and theft, often rooted in systemic failures like poor monitoring and insufficient infrastructure. Comfort satisfaction significantly influences overall safety, with COUS buses providing higher safety perceptions. While demographic factors like gender and age had minimal impact, harassment remains a major issue, especially for female students. The study recommends enhancing surveillance systems, increasing transport frequency, and implementing gender-specific interventions. While some recommendations, such as mobile apps and awareness campaigns, are feasible for immediate implementation, more extensive measures, like infrastructure upgrades, may face financial and bureaucratic challenges. Addressing these challenges will be essential for improving

the commuting experience for college students in Algiers and ensuring a safer public transportation system.

During the preparation of this work, the authors utilized the ChatGPT and Grammarly tools to enhance the readability and language of the paper through paraphrasing. After employing this tool, the authors thoroughly reviewed and edited the content as necessary, taking full responsibility for the publication's content.

ACKNOWLEDGMENT

In memory of my mom, BENCHANAA Fadila, who left us way too soon on 26th November 2024.

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