Risky Behaviors Among Motorcyclists: A Qualitative Study in Argentina

Introduction

Motorcycle riders are among the most vulnerable groups of road users (World Health Organization –WHO-, 2023). They are more exposed to crashes and injuries than any other road users. Their safety can be compromised by risky behaviors such as driving under the influence of alcohol, speeding, and not wearing a helmet (WHO, 2023). Alcohol-impaired driving increases the likelihood of head injuries during a crash (Lao & Lukusa, 2023). Inappropriate or excessive speeding is widespread among motorcyclists and one of the main contributing factors in motorcycle crashes and injury severity (Ding et al., 2019; Ledesma et al., 2024; Prajongkha et al., 2023, Yousif et al., 2020). On the contrary, 20mph/30kph speed limits and zones are associated with a reduction in crashes and injuries (van Erpecum et al., 2024). Similarly, wearing a helmet is a protective factor against head injuries (Lao & Lukusa, 2023; Tongklao et al., 2016).

The unsafe behavior of motorcyclists has a comparatively greater impact in low- and middle-income countries where riding a motorcycle is more prevalent than in high income ones (WHO, 2023). In Argentina, a middle-income economy, they are the group of users most exposed to traffic fatalities. During 2022, four out of ten traffic deaths were motorcyclists (Dirección Nacional de Observatorio Vial, 2023). Although much emphasis has been placed on promoting and enforcing helmet use, other risky behaviors have received less attention from the national and local governments. In recent studies conducted in the cities of Córdoba and Buenos Aires, helmet use ranged from 59% to 86% among drivers and from 42% to 83% among passengers respectively (Johns Hopkins International Injury Research Unit, 2023a, 2023b). These results are consistent with previous studies indicating that helmet use decreases as the number of occupants increases (Rusli et al., 202; Tosi et al., 2016; Xuequn et al., 2011). On the other hand, the percentage of motorcyclists exceeding the speed limit (Córdoba: 62%; Buenos Aires: 55%) was higher than that of other road users (Johns Hopkins International Injury Research Unit, 2023a, 2023b). There is no previous research in Argentina that assess the prevalence and risks of driving under the influence of alcohol among motorcycle users.

Previous evidence indicates that risky behaviors among motorcyclists are related to vehicular, contextual, and human factors. The type of motorcycle, weather, days of the week, and road design have been related to not wearing a helmet and speeding (Ledesma et al., 2024; Tosi et al., 2016). Among human factors, sex, age, attitudes, norms and beliefs were associated with not wearing a helmet, speeding, and driving under the influence of alcohol (Duong & Parker, 2018; Sukor & Fujii, 2011; Tongklao et al., 2016; Tosi et al., 2016). Risk factors also arise from other road users' behaviors, especially drivers, poor road conditions, and the availability of high-displacement motorcycles (Simpson et al., 2015). Most of these studies are based on the use of naturalistic observation methodologies and self-report techniques (e.g., Ledesma et al., 2024; Sukor & Fujii, 2011). Naturalistic observation allows for the recording of objective behavior, avoiding the biases that self-reports can introduce. However, it does not provide information about the internal factors that motivate behaviors. In contrast, self-reports can capture information about these factors but are more sensitive to response biases and have more limitations in adapting to the specific contexts under study (e.g. Nguyen et al., 2022; Ledesma et al., 2015). Qualitative methods allow for an in-depth exploration of the motives and contextual factors relevant to specific cultural and geographical regions, but they have been used less frequently in this type of research (e.g. Nguyen et al. 2022; Simpson et al., 2015).

This qualitative study aims to examine motorcyclists' opinions on the factors and behaviors that affect their safety on the roads and the measures that could enhance it. The specific objectives were: (a) to explore how motorcyclists perceive risk and exposure to road crashes, along with the factors associated with these incidents (risk factors); (b) to identify the behaviors viewed as most risky and examine the beliefs surrounding them; (c) to investigate the strategies they employ to mitigate risks and understand their motivations for self-protection; and (d) to assess how they evaluate various public measures aimed at improving safety (e.g., Infrastructure Enhancements, Law Enforcement, Public Awareness Campaigns, etc.). Furthermore, we seek to identify potential differences related to gender, age, city, and type of motorcyclist (general population versus delivery riders).

2 Method

Participants

Sixty-three Argentine motorcycle riders took part in the study. Participants were recruited from the cities of Córdoba and Buenos Aires, as well as their metropolitan areas, and were organized into eight focus groups (see **Table 1**). In each city, four in-person groups were held: two composed of motorcycle riders from the general public, and two of riders who use motorcycles for work. Among these were platform workers (e.g. uber, rappi), couriers, and self-employed individuals. A detailed description of the participants in each group can be found in Appendix A (tables A1-8). **Table 2** provides a summary of the sample characteristics in each city. Participants ranged in age from 18 to 49 years old, with 30% being women. The educational level of participants was high school or higher. Most were frequent motorcycle riders, using their motorcycles both for personal transportation and work. They predominantly rode low-displacement motorcycles, mainly of the CUB and Urban standard types.

Table 1. Segmentation of focus group by Age Group, User Type, and City

	Buenos Aires	**Córdoba**
Young people		
Motorbike Workers	Group 1 (n=8)	Group 5 (n=8)
General Population	Group 2 (n=7)	Group 6 (n=8)
Adult people		
Motorbike Workers	Group 3 (n=8)	Group 7 (n=8)
General Population	Group 4 (n=8)	Group 8 (n=8)

Table 2. Summary of Sample Demographics and Riding-Related Variables Across Both Cities.

Variable	**%** (n)	
	Buenos Aires	**Córdoba**
Sex		
Male	64,5 (20)	50 (16)

Female	35,5 (11)	50 (16)
Education		
Secondary(incomplete)	0	15.6 (5)
Secondary(complete)	35.5 (11)	43.8 (14)
University/Tertiary(incomplete)	48.4 (15)	21.9 (7)
University/Tertiary(complete)	16.1 (5)	18.8 (6)
Motorbike use (main reasons)		
Go to work	67.8 (21)	53.1 (17)
Personal transport	58.1 (18)	68.8 (22)
Delivery	51.6 (16)	50 (16)
Recreation	35.5 (11)	25 (8)
Family transport	15 (5)	43.8 (14)
Riding Frequency		
Every day	51.6 (16)	56.3 (18)
Almost every day	32.3 (10)	34.4 (11)
Two-three days a week	12.9 (4)	6.3 (2)
Few days a month	3.2 (1)	3.1 (1)
Motorbike cc		
Less than 150 cc	77.4 (24)	68.8 (22)
150 cc or greater	22.6 (7)	31.3 (10)
Motorbike type		
CUB	19.4 (6)	43.8 (14)
Urban standard	35.5 (11)	43.8 (14)
Enduro/cross/trail	12.9 (4)	3.1 (1)
Sport/Naked	19.4 (6)	3.1 (1)
Scooter	6.5 (2)	0
Chopper/Cruiser	0	3.1 (1)
More than one type	6.5 (2)	3.1 (1)
Crashes (two-last months)		
No	83.9 (26)	87.5 (28)
Yes, without damage or injuries	9.7 (3)	6.3 (2)
Yes, with damage or injuries	6.5 (2)	6.3 (2)
Fines		
Yes	38.7 (12)	12.5 (4)
No	58.1 (18)	87.5 (28)
Non-response	3.2 (1)	0
Speeding Frequency		
Never	25.8 (8)	21.9 (7)
Rarely	22.6 (7)	34.4 (11)
Sometimes	32.3 (10)	37.5 (12)
Often	19.4 (6)	6.3 (2)
Always	25.8 (8)	0
Passenger Frequency		
Never	12.9 (4)	9.4 (3)

Almost Never	32.3 (10)	18.8 (6)
Occasionally	41.9 (13)	37.5 (12)
Frequently	12.9 (4)	34.4 (11)

Instruments

A questionnaire (Appendix B) and a Focus Group Interview Script (Appendix C) were utilized. The aim of the questionnaire was to obtain personal information from participants and information regarding their experiences using motorcycles. It gathered socio-descriptive data (e.g., sex, age, education) details about motorcycle use, recent involvement in crashes and fines, as well as basic knowledge of traffic regulations (e.g. posted speed limits, BAC limits, passengers law).

The focus group discussions followed an exploratory approach to various topics relevant to motorcyclist safety. This approach aimed to identify aspects that had not been previously considered by the researchers. However, a discussion guide was developed to explore key factors, including contributors to risk exposure, motorcyclists' behaviors, their motivations for staying safe, and their evaluation of initiatives designed to enhance their safety. The topics covered in the guide reflect the research team's prior experience in the field (e.g. Ledesma et al. 2015; Ledesma et al. 2024; Tosi et al., 2023). Additionally, a safe system perspective was adopted (Organización Panamericana de la Salud, 2024).

Table 3 provides a summary of the key dimensions addressed in the interview script, along with sample questions.

Table 3. Main topics addressed in the focus group interview script.

Topics	Sub-topics	Aim of Inquiry	Sample Question
1: Risk perception and exposure	Motorcyclists as a vulnerable road user group. Perceived level of vulnerability. Perception of risk associated with motorcycle riding.	To assess awareness of the increased road risk associated with motorcycle use.	Statistics show that motorcyclists are overrepresented in crash data. What are your thoughts on this? Do you think motorcycles are more dangerous than other modes of transportation?
2: Contributing Factors to Road Crashes	Perception of risk factors. Vehicle, environmental, and human factors.	To explore the main "causes" attributed to motorcycle collisions.	What do you believe are the primary factors that lead to crashes among motorcyclists? Among all the contributing factors, which do you consider to be the most significant?
3: Motorcyclists' Risky Behaviors	Self-awareness of risk-related behaviors. Speeding and associated factors. Use of helmet. Alcohol and motorcycle riding. Distractions (use of cell phone). Normative beliefs and risky behaviors.	To evaluate the extent of awareness about different risk behaviors.	Are there specific behaviors or factors among motorcyclists that increase their risk? If so, what are they? What are your thoughts on speeding? Is it a common behavior among motorcyclists, and if so, why do you think that is?
4: Motivation and Strategies for Risk Reduction	Safety and protective practices. Strategies for risk reduction. Motivations for self-protection.	To identify the strategies, they employ to mitigate risks and the motivations that	What do you do to stay safe or lower the risk of crashes on the road? What do you think is the main reason to take care of yourself?

		encourage them to safeguard themselves.	
5: Initiatives to Enhance Motorcycle Safety	Perception of measures to enhance motorcyclist safety (Infrastructure Enhancements, Law Enforcement, Road Safety Education, Public Awareness Campaigns, Licensing Regulations, Etc.)	To determine which strategies are perceived as most effective for improving motorcyclist safety.	What do you think needs to be done to make motorcyclists safer? What do you think would be the best ways to make a difference?
6: Socio-demographic factors associated with motorcycle safety.	Perception of differences by gender, age, and occupation.	To explore potential differences based on age, gender, and occupation.	Are there differences between young people and adults in the topics we've discussed? And what about between men and women?

Procedure

The study was reviewed and approved by the Institutional Review Board (IRB) of the Biomedical Research Alliance of New York (BRANY) under the project title "Formative Research on Knowledge, Attitudes, Risk Perceptions, Social Norms, and Road Safety Behaviors of Motorcyclists in the Cities of Buenos Aires and Córdoba" (BRANY Study ID: 24-228-522). Ethical guidelines for focus group studies were adhered to throughout the research process. Participants were recruited by a company specializing in panel studies, adhering to the group composition criteria determined by the researchers. In each city, the focus groups were conducted in a Gesell room equipped with audio and video recording capabilities, internet access, video streaming, a television, a whiteboard, markers, and a flip chart, as well as an additional space for meetings. A guide was created to facilitate the group sessions, outlining the general coordination criteria and the interview script. Each group session followed this structure: (1) Introduction, which included welcoming participants, study objective, reinforcement of anonymity and confidentiality, and explaining the dynamics and time frame of the focus group (5 minutes); (2) Request for informed consent (5 minutes); (3) administration of a Structured Questionnaire (5 minutes); (4) Ice-Breaker and participant introductions (5 minutes); (5) Discussion (90 minutes approximately); and (6) Closing (5 minutes). Coordination was provided by two Argentine psychologists, both specialists in traffic psychology and road safety.

Data Analysis

The sessions were transcribed and analyzed by the researchers. For data analysis, we follow the general strategy outlined by Hennink (2007), which included data preparation, identifying themes within the data, labeling data according to topics/themes, and analyzing and synthesizing the emerging themes.

The interviews were independently coded by the two researchers who facilitated the focus groups. The coding process was conducted manually using the constant comparison method (Braun & Clarke, 2006). Initially, data analysis followed the structure of the discussion guide used in the focus groups. However, an inductive approach was also employed, aligning with the study's exploratory nature. This approach allowed for the emergence of themes and categories that had not been previously considered. Any discrepancies in code assignments or category names were resolved through discussions that led to consensus. Notably, these differences were minimal.

Results

Knowledge about traffic regulations

Table 4 summarizes the results of the questionnaire regarding riders' knowledge. In both cities, speed limits on avenues (i.e., 60 km/h) are recognized more accurately than those on streets (i.e., 40 km/h). The most frequent error was the assumption of a lower limit than the actual one (50 km/h on avenues and 30 km/h on streets). Concerning Blood Alcohol Concentration (BAC), there is a common misconception in Buenos Aires that a "zero tolerance" policy exists, likely due to the enforcement of this rule in the provincial jurisdiction. In contrast, most respondents in Córdoba correctly identified that there is zero tolerance. Additionally, there is generally a high level of ignorance regarding the regulations governing the transportation of minors, with prohibitions against transporting children under 16 years in Buenos Aires and under 6 years in Córdoba.

Table 4. Conocimientos de los participantes.

	Bs As	Córdoba
Knowledge Speed Avenue		
Right answer	74.2%	62.5%
Wrong answer [a]	25.8%	28.1%
Not sure	0%	9.4%
Knowledge Speed Street		
Right answer	54.8%	40.6%
Wrong answer [b]	35.5%	59.4%
Not sure	9.7%	0%
Knowledge BAC		
Right answer	32.3%	93.8%
Wrong answer [c]	54.8%	6.2%
Not sure	12.9%	0%
Knowledge Child Passengers Law		
Right answer	19.4%	43.8%
Wrong answer [d]	80.6%	56.3%

a. Most common mistake: a speed limit lower than the current one (40 km/h).
b. Most common mistake: a speed limit lower than the current one (60-70 km/h).
c. Most common mistake: zero tolerance to drink driving in Buenos Aires.
d. Most common mistake: children under 16 allowed as passengers in Buenos Aires.

3.2 Focus groups discussion results

The results of the focus groups are organized according to the main topics outlined in the interview script, with each section highlighting the key emerging issues. Annex … summarizes the main findings and provides illustrative comments from the participants.

3.2.1 Risk perception and exposure

Participants perceive motorcycles as agile, practical, and economical vehicles that enhance mobility in urban settings. A young woman described it as follow: “My motorcycle is my main

mode of transportation. It's more convenient than a car for parking or getting somewhere quickly (private user, Córdoba). There is a shared consensus among them on recognize motorcycles as a more dangerous and risky mode of transportation. Riders are aware of the risks and exposure to crashes and injuries. On this matter, a participant from Buenos Aires said "You're more exposed on a motorcycle. In a car, you feel like you're safer. But on the bike, if they bump you a little, you're gone" (young woman, worker). Nevertheless, there is an acceptance of these risks as an intrinsic part of riding motorcycles. As a young motorcyclist stated: "I know it's my body on the line, and if anything happens, that's it. So yeah, I'm a bit nervous, but I still ride." (Private user, Buenos Aires). They also note that as confidence grows, the perception of risk diminishes, and that overconfidence leads to collisions. Overconfidence is related to the perceived ability to control the motorbike rather than the number of years of driving experience. As two young men noted "it's also about being overconfident. If you've got a lot of experience, you get cocky", "That's the other thing, you get cocky and you kill yourself."

3.2.2. Contributing Factors to Road Crashes

When participants are asked about the contributing factors to road crashes, several issues emerge. The foremost concern is the interaction with larger motor vehicles, such as cars, buses, and trucks. Infrastructure, environmental, and vehicular factors are mentioned to a lesser extent. For workers, job conditions and time pressure are also noted as contributing factors. Conversely, the behaviors of motorcyclists themselves are generally not spontaneously mentioned as risk factors. Below, we briefly describe each category.

Interactions with Other Road Users

Reckless behavior by car drivers and operators of larger vehicles is seen as the greatest safety concern and a major source of risky situations for motorcycle riders. Motorcyclists frequently encounter conflicts with other road users due to misunderstandings of traffic rules or aggressive behavior from the latter. In this regard, one of the motorcyclists pointed out "Car drivers here don't understand motorcycles. Just yesterday, a pickup got way too close to me while I was riding in my lane, the way you're supposed to, and it nearly hit me (adult man, private user, Buenos Aires). Motorcyclists perceive a struggle for space on the road and aggressive competition to claim it, leading to hazardous situations. For example, an adult man from Buenos Aires mention:

> On General Paz, you see a big truck or a massive van and think, "I'll just pass them, zigzag a bit, and be done with it." It's not about showing off; I do it because I feel safer once I'm past these big vehicles—or buses. (private user).

Drivers of cars, taxi drivers and public transport vehicles are cited as frequent sources of danger ("When there's a taxi driver next to me, I try to get away because we're natural enemies on the road." -adult man, worker, Córdoba-, "Bus drivers are jerks. They cut you off." -Young man, worker, Buenos Aires). Pedestrians and cyclists also contribute to risky conditions, often through unpredictable actions or failure to follow traffic rules. For example, a young woman from Córdoba said "Cyclists (...) weave everywhere, run red lights, and think they can do whatever they want" (private user). Another young man, also from Córdoba, said that pedestrians, "sometimes just step into the road without looking" (private user).

Infrastructure and Environmental Factors

The participants identify several physical and environmental conditions affecting motorcycle use and safety, including road quality, lighting, and weather. All these factors are perceived to have a greater impact on motorcycle safety compared to four-wheeled vehicles.

They considered that poor road conditions, potholes, lack of clear signage and inadequate lighting significantly increase the risk for motorcyclists. The motorcyclists for all the groups share a negative view of the road environment, which is reflected in several statements. For example: “Not like the mess we have here, full of potholes” (Adult man, private user, Buenos Aires), “Another issue is when the garbage trucks lift the bins, crush everything, and leave the ground all greasy” (Young man, worker, Buenos Aires).

Weather, particularly rain, adds additional challenges. This is an issue that primarily affects workers. While private users agree that they avoid riding in the rain, some workers continue to do so because of the higher pay, despite knowing they’re taking on a greater risk of falling or crashing. A young motorcyclist clearly sums up this situation:

> They see you working, and you get more orders; they prioritize you. Plus, the orders pay a lot more. And people themselves tip you much more. On a normal day, you might make, say, 30 grands in a shift; on a rainy day, you make almost 60, you double it (Buenos Aires).

The time of day also impacts risk levels, with nighttime riding being particularly hazardous. As a young woman said: “there are so many external factors—at night, the danger increases” (private user, Córdoba).

Vehicles safety and riding experience

The type and model of the motorcycle, along with its weight and tires, were highlighted unanimously as key factors influencing safety. For example, a young rider from Buenos Aires said: There are many tires that, when you buy a bike, are made of plastic; with a little water, you slip. Motorcycles often don’t have ABS, which has been around for quite a while” (private user). Another man from Córdoba comment “110cc bikes lack stability” (worker).

Motorcycle maintenance is also signaled as an important factor for safety. Lack of maintenance appears to be more common among smaller motorcycles. As a woman mentioned: “Smaller motorcycles tend to be cheaper, and many—though not all—aren’t well-maintained. You see them with worn tires, no lights, poorly cared for (Young woman, private user, Córdoba).”

Riding experience and properly handling the vehicle (knowing how to operate it) are seeing as critical for safety. Furthermore, the motorcycle's engine capacity may demand different skills, as noted by a motorcyclist from Córdoba:

> “It really depends on the bike. Riding a 110cc bike is not the same as an enduro or a street sport bike. I’ve been riding since I was 13. I’ve ridden 110cc, 600cc, the largest was 200cc, and enduros. Each one has its quirks. So far, the easiest to handle is a 150cc urban bike” (worker).

For women, the demands can be even greater, as reflected in the following statements:

> I've ridden a heavier bike, and it's different. I might manage while riding, but when I have to stop or wait at a traffic light, I can't reach the ground properly. I just touch with the tips of my toes, and the bike might tip over with me (adult woman, worker, Córdoba)".
>
> "My ex had a 250cc bike—I can't remember the brand—and he'd tell me to ride it, but I didn't want to. It was too heavy for me (adult woman, worker, Córdoba).

Riding motorcycles demands different skills, continuous attention, anticipation of the maneuvers of other vehicles, and broader monitoring of all traffic conditions. Two young workers from Buenos Aires put it that way: "The motorcycle rider also has to pay attention to how the person next to them is driving because their driving puts your life at risk too"; "On a bike, you've got like a panoramic view of everything happening around you. It's like riding a bike makes you pay attention to everything."

Knowledge of locations/roads is also helpful. In summary, participants emphasize that operating a motorcycle requires greater skills than driving other vehicles.

Crime and Insecurity

Threats of violence and crime on the streets were identified in all the groups as factors that undermine safe riding. A young woman express it as follows: "The fear of robbery sometimes outweighs traffic rules—working nights makes this worse" (worker, Córdoba). Primarily, the fear of robbery or assault leads to avoidance behaviors that are dangerous for safety, such as speeding and running red lights. For example, a young woman stated: "Nowadays, you stop at a light, and boom, there goes your bike" (private user, Buenos Aires). Experiences with armed thefts highlight the vulnerability of motorcyclists, particularly at night, for workers or in high-crime neighborhoods. Protective measures, such as avoiding stops at red lights, are often adopted to mitigate risks. A young woman phrased it this way: "I work nights, and I ride fast. If I see a red light and there's no one around, I'll cross it. The fear isn't just about getting hit or crashing—it's about getting robbed." (Young woman, worker, Córdoba). In one of the groups, when asked directly which was the greater concern -crime or road safety- the unanimous response of participants was crime.

3.2.3 Motorcyclists' Risky Behaviors

As previously mentioned, motorcyclists' own risky behaviors were not spontaneously mentioned by the participants as a risk factor. It was necessary to introduced and steered the discussion toward this issue, addressing topics such as helmet use, speeding, substance use, and distractions. Adherence to the laws regulating these traffic behaviors and social norms were also investigated. Below are the key impressions and findings in this theme.

Regarding **helmet use**, it is viewed as a fundamental and essential safety measure. It is a common practice among motorcyclists and has become more widespread over time. An adult woman expressed it this way: "Before getting on the bike, you put your helmet on" (worker, Buenos Aires). Not wearing a helmet is perceived as a highly risky behavior. Most motorcyclists feel that it is unacceptable behavior. However, in certain cases, most of them indicated that there are situations where they might not wear it, such as on short trips. As a young man said, "If I'm just going to buy some steaks, I might not bother with the helmet." (private user, Córdoba)

Speeding is a far more common and widely accepted risky behavior. While it is acknowledged as one of the primary risky behaviors, it is often justified by practical benefits, such as arriving at the

destination faster, meeting delivery deadlines, or avoiding potential crime situations. An adult woman express: “Maybe I don’t follow the speed limits in certain areas of San Martín at certain times, but usually, yes, because I know it’s my body, and I’ll get hurt” (private user, Buenos Aires).

Some of them also mentioned that speed provides pleasurable sensations and that the motorcycle itself demands speed (“Motorcycles provide a unique kind of adrenaline, so you seek that thrill” – adult woman, worker, Buenos Aires-). But they also acknowledged the increased risk associated with speeding. An adult woman described it as follows: “The problem is that’s what leads to crashes. It might feel like forbidden adrenaline, but your body pays the price later” (private user, Buenos Aires).

Although slightly exceeding the speed limits is tolerated, riding at high speeds in the residential areas is considered reckless and unacceptable behavior. For example, a young woman from Córdoba said “In a neighborhood, you can’t go that fast. A child could run out, someone walking could appear, someone playing ball, a million things could happen, and it’s just not tolerable” (private user). Overconfidence in driving skills often contributes to normalized speeding, while the lack of consistent enforcement exacerbates these issues. As a young woman described: “I think speed limits are fine, but for one reason or another, you always end up speeding a little more.” (Private user, Buenos Aires)

Riding under the influence (RUI). Alcohol consumption is usually avoided among work-related riders, contrasting with its prevalence in other contexts, like night outings. The discussions on this topic in both cities revealed a significant difference. While in Buenos Aires, riding under the influence was almost universally deemed unacceptable (People who ride motorbikes usually don’t ride drunk. I don’t know many people who’ve done that -young men, worker, Buenos Aires-), the opposite was observed in Córdoba. As an adult man said:

> Generally, there’s a lot of it here in Córdoba. At least, I’ve seen it when I go out to work early in the morning, around 7 a.m. Guys riding drunk, with drunk passengers on the back—it’s a disaster. (worker).

Both work-related and private motorcyclists from Córdoba admitted that it was a common behavior and acknowledged frequently engaging in it themselves. “An adult woman described it as follows: Sometimes, I go out on my bike, drink, and when I’m about to leave, I drink water. Lots of water. If I feel I can’t ride, I call a Cabify” (worker, Córdoba).

Lack of alternative transportation, socializing with other riders, or spending time with friends were mentioned as reasons for alcohol consumption before riding. As seen in the following two statements:

> After working every day, you meet up with other delivery drivers at Plaza España. Everyone chips in, we eat, we drink. Group hangouts like that happen all the time, especially if you know people there (Young man, worker, Córdoba).

> But sometimes you’re far from home, and how else are you supposed to get back? There are no taxis. Uber exists now, but it’s illegal. When I was younger, I hated going out and having to take a bus home because buses don’t run at night, and taxis charge a fortune. So, with a motorcycle, I’d just go and come back, even if I’d been drinking (Young man, private user, Córdoba).

Cellphone use. Although riders acknowledge the dangers involved, cellphone use remains frequent, primarily driven by work demands. A worker described it as follows: “We’re like this (mimics looking at a phone), using GPS, taking orders—it’s me, it’s all of us” (adult man, Córdoba). To mitigate risks, they adopt various strategies, such as memorizing the destination and route, working in areas they are familiar with, stopping to check their phones, or using hands-free devices. Another worker said: “I almost never use my phone—not even GPS. I’ve been in the area for so long that I know it well. For unfamiliar neighborhoods, I stop and check directions” (young man, Buenos Aires). Much less frequent but noted by some young participants were behaviors such as wearing headphones or smoking while riding: “I listen to music with headphones and sometimes have to brake at intersections because I can’t hear honking” (woman, worker, Córdoba).

3.2.4. Motivation and Strategies for Risk Reduction

Faced with risk exposure and the high prevalence of reckless behaviors, motorcyclists identified several factors that encourage them to prioritize safety. Enforcement, family influence and social perceptions play a key role in promoting safer practices. Additionally, personal or indirect experiences with crashes, along with the passage of time, further contribute to reducing risky behaviors.

Below is a more detailed description of each factor.

Family and Social Perceptions

Family members, (mothers, fathers, wives, children, etc.) and societal norms influence attitudes toward motorcycle use and associated risks. Families often discourage motorcycle use due to safety concerns, encouraging riders to adopt cautious behaviors. Some of them put it like this: “My mom doesn’t like it. She gets stressed every time I go out” (Young man, worker, Buenos Aires); “You asked about family—they’re always on alert.” (Adult man, worker, Córdoba). On the other hand, riders feel a strong responsibility to return home safely, either because their family trusts them to ride safely or because they are aware of their loved ones' concerns. Some riders expressed it this way: “I bought gear first to show my mom I wasn’t going to do dumb stuff on the bike” (young man, private user, Buenos Aires); “My kids ask, ‘Did you make it? Are you on your way?’ They worry if I don’t answer” (adult woman, private user, Córdoba). My wife, at least, waits for me to come back or for me to let her know I’m okay. I think they worry as much as we do, or even more (adult man, worker, Córdoba).

Social perceptions of motorcycles as high-risk vehicles further may shape rider behavior:

> “Others see you coming with the box and think, “I’ll get out of the way because this one doesn’t brake.” (Adult man, worker, Buenos Aires)
>
> I think it’s already kind of accepted that people on bikes are going to go fast. They're on a bike, they’re going to zip through traffic. (Young woman, worker, Buenos Aires)
>
> In my case, they thought I’d speed too much or start doing wheelies, like what they see others doing out there. (Young man, private user, Buenos Aires)

Personal experience

Past traffic events and life changes can influence riders’ behavior. Participants acknowledged that personal or friends’ experiences with crashes and the potential for financial losses made them more cautious. Older motorcyclists recognize that a crash can lead to serious physical and financial harm with lasting consequences. Two adult riders put it that way:

> You change based on what happens to others, what happens to you, and because you mature. You know you're going to get hurt, and as you get older, it's worse. (Worker, Buenos Aires).
>
> It's much more expensive to have a crash without health insurance or even with insurance that doesn't have providers. Buying new parts, paying for the other person's damage—it's costly. (Worker, Córdoba)

Among the key life changes, the responsibility of caring for their families and children serves as a strong motivator to avoid risky behaviors, regardless of age. For example, a young man said:

> I've ridden motocross, so I have decent bike-handling skills, but I've had two crashes and many falls. Those experiences made me slow down and ride more cautiously. And becoming a father also made me ease off the throttle. (Worker, Córdoba)

3.2.5. Initiatives to Enhance Motorcyclists' Safety

Just as motorcyclists had an intrinsic motivation to stay safe—reflected in their concern for their families and in avoiding material damage and injuries—also acknowledged the existence of initiatives that can influence their behavior, including social communication, traffic education and training, the process of obtaining a driver's license, and road inspections. However, they expressed a critical perspective on each of these initiatives, highlighting deficiencies in all of them and offering suggestions for improvement. Conversely, one initiative that was unanimously rejected was the reduction of speed limits. The following is a more detailed description of each dimension.

Safety Campaigns

Opinions on safety campaigns were mixed. Some believed they would not significantly impact people's behavior. An adult motorcyclist summarizes it as follows: "No, there's no chance. No campaign will work. A biker won't accept it psychologically, there's no way, no matter the campaign" (worker, Buenos Aires). However, others saw safety campaigns as valuable tools for influencing behavior but recognized certain limitations and challenges in achieving lasting change or reaching large audiences. One challenge they highlighted was their limited duration. As one young motorcyclist put it: "Campaigns help, but they pass by quickly" (private user, Córdoba). Another aspect that generated differing opinions was the medium used for campaigns. Some participants highlighted the broad reach of traditional platforms like TV:

> For me, they need to be on TV. No one's going to watch that on social media. If the government posts it on social media, kids will scroll past it. But if it's on TV, you have to watch it until it's over (young woman, worker, Córdoba)

Others argued that social media is more effective, particularly among younger audiences ("It would be great to show it on digital platforms where teenagers are more active, so the message reaches them." –Young woman, worker, Córdoba), and others questioned the possibility of reaching all audiences simultaneously:

> The thing is, it's harder now to create something that sticks like before. Back then, as you said, we all watched TV. Today, there are 400 networks, and people choose what they want to watch. (Adult man, private user, Buenos Aires).

The content that advertisements should feature was also a subject of debate. The proposed topics were diverse, and no unanimous consensus was reached. Some participants advocated for

campaigns that focus on family-centered messaging and real-life consequences ("A message that involves family would resonate." (Adult man, private user, Córdoba). Another type of content that participants found appropriate is those that create a strong impact on people, such as images of crashes or injured individuals.

> Impactful messages reach people. Recently, I saw an ad—I don't remember if it was on TV or a billboard—it showed a taxi, a bloodstain, everything in gray, a yellow taxi, red blood, and a broken motorcycle, saying, "We share the same road, but these are the consequences." These things leave an impression. (Adult man, worker, Córdoba).

Conversely, some young riders, proposed the use of humor for younger motorcyclists ("I think there should be more information, maybe through humor." -Young man, worker, Buenos Aires-). Some riders emphasized self-care and the need to address overconfidence as potential themes for effective campaigns ("A campaign like "Don't get cocky" would be good –young man, worker, Buenos Aires-. "An ad well made that say: "They don't see you, don't let your guard down, think about yourself.". -Young man, worker, Buenos Aires-). Workers also highlighted self-care but suggested that focusing on the demands of gig economy jobs would be a relevant theme for future initiatives. Additionally, they discussed the sources of information used in awareness campaigns.

In summary, opinions on health campaigns produced a broad range of opinions, with no clear consensus on their different aspects. This presents a challenge in designing effective campaigns for motorcyclists.

Education and training

Participants identified efforts aimed at improving knowledge of safe riding practices and promoting responsible behavior. Participants highlighted the importance of incorporating road safety education into school curriculums. An adult man expressed it this way:

> "I think they should start teaching traffic safety in high schools when kids are 14 or 15. At that age, you think you're invincible, and that's usually when you start driving. Fine, let them start, but make it a subject for the next three years, and they should have to pass it like any other course. Also, they shouldn't be able to get their license unless they pass." (Adult man, private user, Córdoba).

They suggested using real-life testimonials and graphic content to underscore the consequences of risky behaviors. ("Show them someone who's been split in half, someone in a wheelchair, someone who can't walk anymore." -Adult man, private user, Córdoba-). The training process for obtaining a driver's license were identified as viable channels for delivering the intended message.

Licensing and Regulation

Riders strongly criticized the processes and standards for obtaining motorcycle licenses and their enforcement. The licensing process was criticized for its lack of rigor and inconsistency across jurisdictions. Participants advocate for stricter requirements, emphasizing the need for practical tests that assess real-world riding skills ("There should be a driving test, you know, that makes people prove their skills." -Young man, worker, Buenos Aires-). Current tests were often deemed insufficient, with theoretical components focusing on basic literacy rather than practical competence; "The motorcycle test is just weaving between a couple of cones and coming back." -Young woman, private user, Córdoba-). However, another major concern in Córdoba was the lengthy process of obtaining a license and its high cost. ("The courses take too much time, cost too much money, and they schedule you six months out. It's ridiculous." -young woman, private user,

Córdoba-). Improving licensing standards is considered vital for enhancing safety and fostering behavioral changes among riders.

Traffic Enforcement

In both cities, traffic enforcement was almost unanimously regarded as the most effective way to increase motorcyclists' compliance with traffic rules. However, all participants had a bad opinion of traffic enforcement. They viewed it as inconsistent and primarily punitive rather than preventive ("Instead of raising awareness, they're looking for ways to screw you over." -Young man, worker, Buenos Aires-). While helmet and documentation checks are frequent, broader enforcement of traffic laws remains lacking.

> Controls have improved a lot in Córdoba, especially for motorcycles and helmet. There are also police checkpoints specifically for bikes—to check if they're stolen or if you have your papers (young woman, worker, Córdoba)

Some participants, mainly workers, perceived enforcement as targeting specific groups, such as delivery riders, disproportionately "They stop people who are working. I always see them stopping workers who rely on their motorcycles." -Young man, private user, Córdoba-). In Córdoba, the effectiveness of enforcement was questioned, with many riders believing current actions fail to adequately deter unsafe behaviors ("Checkpoints are poorly placed officers just watch people break the rules without doing anything." (Young woman, worker, Córdoba-; "People are used to there being no enforcement. When there is, they know the days and places young woman, private user").

Lowering speed limits

When asked, motorcyclists unanimously rejected the idea of lowering speed limits as a preventive measure. They argued that the current maximum speed limits are appropriate. A young woman from Buenos Aires said: I wouldn't change them, I'd leave them as is, not lower them (worker). Additionally, they believed that even if these limits were reduced, they would not be respected ("Whether you lower or raise them, no one will follow them." -Adult man, worker, Córdoba-). Interestingly, many were unaware of the current speed limits and, in some cases, assumed they were lower than they actually are.

3.2.6. Socio-demographic factors associated with motorcycle safety.

Gender

Participants noted that gender plays a role in shaping motorcycle usage, experiences, and perceptions. Women tend to prioritize cautious behaviors, often linked to family responsibilities. In contrast, male riders, particularly younger ones, are more likely to engage in risky behaviors, such as speeding or racing. An adult woman from Buenos Aires expressed it that way: So, I'm here fighting it out in the jungle, but still, I'm calm. I think women—sorry, guys—are a bit more cautious while driving (private user). Meanwhile, a man in the same group summed up the discussion by saying "women are more cautious; they think more, like paying extra attention, driving slower, and so on."

Female riders often face additional challenges compared to their male counterparts, including targeted aggression and societal stereotypes. Gender stereotypes exacerbate risks for women, as they are often perceived as less capable or assertive, leading to reduced respect from other road users. Women from different groups reported having similar experiences. Which was reflected in

their comments: “Because you’re a woman, you’re riding a bike, and the machismo kicks in.” (Young woman, worker, Buenos Aires); “People already stereotype bikers, and if you’re a woman, it’s worse” (Young woman, private user, Buenos Aires); "Women are always looked at like, ‘She doesn’t know what she’s doing’" (Young woman, private user, Córdoba).

Age

Motorcyclists noted that age influences motorcycle use, experiences, and perceptions. Older motorcyclists observed that, over time, they adopted more cautious behaviors and abandoned risky practices. They attributed this change to increased maturity and the heightened awareness of physical vulnerability in the event of a crash. Two riders described it as follows:

> “I think it’s an age thing. I don’t feel like getting into a crash; I don’t want to break anything. When I was 16, I’d say, “I don’t care,” and drive at 120 km/h, even going the wrong way. But now, I don’t want to get hurt.” (Adult man, worker, Córdoba).
>
> At 18, the first thing you want is a bike because buying a car is out of reach—at least for most. So, you say, “I don’t care about the risks,” and that’s fine. But when you’re 40—and I have a kid on the way now—I’ve got a big, nice bike, the kind I’ve always wanted, but now I look at it with frustration. You start to feel you have more to lose. An 18-year-old doesn’t have a family—they have their parents, but kids that age don’t think about it.

Work

Working with a motorcycle, particularly for platform workers, was perceived as a situation that increases risk. Workers understand that the legal framework regulating working conditions does not protect them. A female worker from Córdoba expressed it this way: “Better laws to improve traffic conditions for workers.” (Young woman). On the other hand, if they suffer an injury in a crash, the amount of money the company provides is extremely low:

> I think they pay you three thousand pesos per day, for, I think, up to 60 days sometimes. It’s a pittance, but at least you can request something, so they keep paying. (Young man, Buenos Aires)

According to them, the primary contributing factor to risk is the time pressure associated with delivering orders. This was described for a rider who said: “We want to go faster because the faster we go; the more money we make. So, everyone’s like that, and when they stop, they do this (mimics a snake-like motion), trying to get ahead” (Adult man, worker, Córdoba). Additionally, the increased exposure to traffic is a risk factor in itself. To reduce the likelihood of crashes, those who can afford to did so select their working hours, weather conditions, and the neighborhoods where they operate. A young woman phrased it this way: I also choose my hours and the weather. If I see the humidity’s over 50%, I won’t go out that night.

Geographic Dynamics

Variations in motorcycle use and safety perceptions across different urban and suburban contexts. Safety conditions and riding behaviors vary significantly between central and suburban areas (“You cross General Paz, and no one wears helmets.” -Young man, worker, Buenos Aires-). Suburban riders face poorer infrastructure, less enforcement, and higher exposure to crime (“The streets in the capital are horrible, and even worse in the province.” -Young woman, private user, Buenos Aires-; "In smaller towns, there’s no enforcement, and people don’t take traffic rules seriously." -Young woman, worker, Córdoba-). Protective gear, uncommon in some neighborhoods, can make riders stand out as targets, further influencing riding practices (I’m from Berazategui, and sometimes I feel

ridiculous with all my gear on—helmet, jacket, everything. It's like you're showing yourself as a target, kind of… young man, private user, Buenos Aires). On the other hand, neighborhoods can encourage more cautious behavior. This is often attributed to the recognition that local streets do not allow to speed and may have pedestrians or children playing conditions that are less common on main streets.

4. Discussion

Motorcyclists perceive their vehicles as both advantageous and inherently dangerous. The type and model of the motorcycle, along with riding experience, are critical for safety. Despite being aware of the potential for crashes and injuries, riders accept these risks as a part of the motorcycle experience. This duality reveals a normalization of risk, particularly among experienced riders, whose overconfidence paradoxically increases vulnerability to crashes. This finding aligns with studies suggesting that risk habituation is common among frequent riders (Rudin-Brown & Jamson, 2013). However, the tension between risk awareness and normalization highlights the challenge of fostering sustained behavioral change, as acknowledging risk does not necessarily translate into precautionary action.

Participants highlighted external factors such as the behavior of other road users, infrastructure deficiencies, and environmental conditions as sources of risk, while underemphasizing their own risky behaviors. They also mentioned that crime and violence on the streets, such as robbery or assault, lead them to engage in risky behaviors to avoid danger. Additionally, they perceived that the risk factors motorcyclists face differs from those encountered by car drivers, as motorcyclists are more physically exposed despite sharing the same road environment. These findings align with previous research suggesting that motorcyclists and car drivers perceive distinct sources of hazards within the road environment (Shahar et al., 2010). Without downplaying the influence of these external risk factors, this externalization of responsibility may reflect a cognitive bias that minimizes personal accountability, which has been observed in other studies of road user behavior (Huth et al., 2014; Reason, 1990). Huth et al. (2014) noted that motorcyclists often failed to recognize the influence their behavior could have on enhancing their safety. Yet, when prompted, motorcyclists in the present study acknowledged their behavior as significant risks, illustrating a contradiction between spontaneous perceptions and reflective responses.

Although speeding significantly contributes to the likelihood of crashes and injuries among motorcyclists (Ding et al., 2019; Prajongkha et al., 2023; Road Safety Observatory of the City of Buenos Aires, 2019; Yousif et al., 2020; Truong et al., 2019), the participants in this study acknowledged it as a common behavior, often driven by the thrill of riding at speeds exceeding the legal limit. In line with this, Nguyen et al. (2022) indicated that speeding often results from behaviors such as showing off, competitiveness, or thrill-seeking. Among platform workers, a common reason for exceeding the speed limit was the time pressure to fulfill orders and secure additional trips. The link between working conditions, risky behaviors, and road incidents is particularly prevalent among gig economy workers (cf. Christie and Ward, 2023; Hsu et al., 2024; Oviedo-Trespalacios et al., 2022; Papakostopoulos & Nathanael, 2021; Zheng et al., 2019).

Cell phone use was particularly prevalent among workers, and both speeding and cell phone use were often justified by their perceived practical benefits. However, this behavior may increase risk, as Ledesma et al. (2023) noted in a study with Spanish motorcyclists. Among them, distraction was associated with higher levels of self-reported errors while riding. Moreover, using a mobile phone for texting or searching for information has been linked to an increased risk of being involved

in a crash or fall, as demonstrated by Truong et al. (2019). In this context, it is worrisome that recent studies further show that cell phone use has become a widespread risky behavior among motorcyclists (Nguyen-Phuoc et al., 2024).

Helmet use was widely regarded as essential for safety (e.g., Lao & Lukusa, 2023; Truong et al., 2019). The participants in this study reported widespread use of helmets, unlike other safety gear such as protective clothing or footwear. One likely reason is that helmet use is the only legally mandated requirement for motorcyclists. Besides, in Argentina, communication campaigns have heavily emphasized this practice, and traffic police regularly enforce it. However, some riders admitted to occasionally skipping helmets during short trips or choosing not to use them depending on the context. For instance, in Córdoba, helmet use appeared to be lower in neighborhoods, whereas in Buenos Aires, this behavior was more common in the metropolitan area, not in the city. These responses were consistent with observational data indicating a higher prevalence of helmet use in Buenos Aires compared to Córdoba (Johns Hopkins International Injury Research Unit, 2023a, 2023b). Geographic variations in perceived crime exposure and enforcement suggest that environmental conditions can significantly influence safety behaviors. Prevention policies should be coordinated and consistent both within and between jurisdictions.

Alcohol consumption, meanwhile, exhibited notable regional differences in attitudes. In Córdoba, motorcyclists acknowledged that alcohol consumption is widespread among riders. Among the reasons cited for this behavior were spontaneous interactions with other motorcyclists, nighttime outings, and the lack of safe transportation alternatives. Similarly, Nguyen et al. (2022) identified several contextual barriers for drink riding, including the absence of safe alternatives for returning home after drinking and the financial cost of using alternative transportation. In contrast, participants from Buenos Aires overwhelmingly described drink riding as an uncommon behavior that severely impairs driving ability. These findings underscore the need for targeted interventions aimed at reducing these risky behaviors and improving road safety.

Conflicts with larger vehicles were identified as a primary safety concern. The competition for road space and the aggressive driving of other users exacerbates this issue. Other motorcyclists, cyclists and pedestrians also contribute to risky situations through unpredictable actions. Motorcyclists often face conflicts due to misunderstandings of traffic rules or aggressive behaviors from other road users. The interaction with them has proven to be a significant concern in various contexts (e.g. Huth et al., 2014). Motorcyclists must maintain continuous attention and anticipate the maneuvers of other vehicles and users, including thieves. The threat of assault places motorcyclists in a constant state of heightened awareness. Thieves, often motorcyclists themselves, increase the need for riders to be vigilant to distinguish them and other road users. This often leads riders to exceed speed limits or run red lights as strategies to mitigate the perceived imminent danger. This finding underscores the systemic nature of road safety, where the behaviors of all users influence outcomes (WHO, 2023). Addressing these dynamics requires a comprehensive approach that includes education, enforcement, police measures aimed at reducing crime and infrastructural changes (WHO, 2023).

Substandard road conditions, inadequate lighting, and adverse weather challenges disproportionately affect motorcyclists compared to drivers of four-wheeled vehicles. Nighttime riding and rainy days were regarded as particularly hazardous and was avoided whenever possible. However, some workers acknowledge that they choose to ride under these conditions because it allows them to earn more money. The heightened sensitivity of motorcycles to environmental factors underscores the need for targeted infrastructure improvements. This finding aligns with evidence showing that poor road conditions increase crash risk (Nguyen et al., 2022) while well-maintained roads and adequate lighting significantly reduce crash rates (Elvik et al., 2009).

Family influence and personal involving in crashes and near crashes were identified as key motivators for safer practices. Families often serve as foundational units where safety behaviors are modeled and reinforced (Poó et al., 2023). For motorcyclists, the concern expressed by family members regarding their safety consistently emerges as a significant factor, acting as a strong motivator for riders to prioritize self-care and adopt safer practices. On the other hand, previous involvement in road crashes serves as a compelling reminder, reinforcing a heightened commitment to self-care and personal responsibility. These findings highlight the potential of harnessing intrinsic motivations and family pressures in safety campaigns. However, the effectiveness of these strategies may vary across demographic groups, underscoring the need for tailored interventions that account for cultural and sociodemographic factors to maximize their impact (Lewis et al, 2008; Lewis et al., 2019). For example, among riders who are parents, their children may serve as a stronger motivation for practicing self-care compared to other family members or close acquaintances.

Participants acknowledge various initiatives aimed at improving safety but express critical views on their effectiveness in changing motorcyclists' behaviors. They regard enforcement as the most effective method to ensure law compliance. However, the current enforcement methodologies have received significant criticism, with calls for improved practices in this area. Another key issue recognized for enhancing safety is licensing, as it ensures riders are knowledgeable about traffic laws and capable of operating their vehicles. However, once again, the current licensing systems have faced significant criticism due to their lack of rigor, inconsistencies between districts, and questions regarding their validity, among other concerns. On the other hand, social communication campaigns and road safety education are viewed as additional potential measures, but they are not considered pivotal in driving behavior change. There was no unanimous position within or across groups regarding the content of campaigns. Participants suggest that family-centered messaging and a focus on real-life consequences would be more impactful themes for campaigns. Some of them, particularly young riders, proposed the use of humor in safety messages. Additionally, they recommend integrating road safety education into school curriculums and using compelling testimonials to raise awareness. The choice of medium for campaign distribution was also debated, with no clear consensus. Some participants considered TV the most effective platform, while others argued that social media would be better, particularly for reaching a younger audience.

International recommendations have long emphasized reducing speed limits as a strategy to prevent crashes and associated injuries (WHO, 2023). While this topic did not emerge spontaneously among motorcyclists, when addressed, it was unanimously dismissed as ineffective. (WHO, 2023). Interestingly, many of them were unaware of the existing speed limits in the city. Recent studies in Argentina have indicated that people perceive the reduction of posted speed limits as not being a highly effective measure for road safety (Poó et al., 2023; Tosi et al., 2024). As a result, the acceptance of such measures tends to be low. Changing this will require interventions aimed at increasing awareness and shifting attitudes toward speeding among road users.

Gender and age were significant factors influencing perceptions and behaviors. Female riders face unique challenges, including societal stereotypes and aggression, which may discourage motorcycle use or reinforce cautious behaviors. Conversely, participants recognized that younger male riders are more prone to risky behaviors, reflecting broader trends in gendered risk-taking (e.g. Rasri et al., 2024; Vasallo et al., 2016; Tosi et al., 2024). Older riders tend to adopt safer practices over time due to increased maturity and awareness of vulnerability. Age-related shifts toward caution further highlight the role of life stage in shaping behavior.

Platform workers experience heightened risk due to time pressures and increased exposure. Time pressure influence speeding and running red lights. Speeding allows them to complete more

deliveries, which in turn enables them to earn more money. This specific risk for workers has been documented elsewhere (e.g. Gupta et al., 2024, Nguyen-Puoc et al., 2024). Some riders mitigate risks by choosing safer working conditions. Geographic context also influences safety, with suburban riders facing poorer infrastructure and higher crime rates. These findings highlight the intersectionality of socioeconomic and spatial factors in shaping motorcycle safety.

Conclusion

This study reveals the multifaceted nature of motorcycle safety, shaped by individual behaviors, interactions with other road users, infrastructure, and broader socio-demographic and geographic factors. The normalization of risk, externalization of responsibility, and variations in behavior across contexts and groups underscore the need for a holistic and nuanced approach to improving motorcycle safety.

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Appendix A

Table A1. Description of participants. Group 1. Motorbike Workers / young people (Buenos Aires)

Age	Sex	Occupation	Have children	Education	Motorbike Type	Motorbike Frequency	Crashes (two-last months)	Fines	Speeding frequency (Self-reported)
26	Male	Delivery	No	Secondary (complete)	Urban standard	Almost every day	No	No	Sometimes
25	Female	Delivery	No	University/Tertiary (incomplete)	Scooter	Every day	No	Yes	Often
24	Male	Employee and Delivery	No	Secondary (complete)	Urban standard	Two-three days a week	No	No	Sometimes
23	Male	Employee and Delivery	Yes	Secondary (complete)	Urban standard	Almost every day	No	No	Sometimes
26	Female	Delivery	No	Secondary (complete)	More than one type	Every day	No	Yes	Never
23	Male	Employee and Delivery	No	University/Tertiary (incomplete)	Enduro/cross/trail	Every day	Yes, without damage or injuries	Yes	Sometimes
24	Male	Delivery	No	University/Tertiary (incomplete)	More than one type	Every day	No	Yes	Rarely
25	Male	Delivery	No	Secondary (complete)	Urban standard	Every day	No	Yes	Rarely
26	Male	Delivery	No	Secondary (complete)	Urban standard	Every day	No	No	Sometimes

Table A2. Description of participants. Group 2. General population / young people (Buenos Aires)

Age	Sex	Occupation	Have children	Education	Motorbike Type	Motorbike Frequency	Crashes (two-last months)	Fines	Speeding frequency (Self-reported)
26	Male	Cybersecurity analyst	No	University/Tertiary(incomplete)	Sport/Naked	Every day	No	No	Sometimes
24	Female	Call center	No	Secondary(complete)	Urban standard	Two-three days a week	No	No	Never
21	Male	Student	No	University/Tertiary(incomplete)	Enduro/cross/trail	Almost every day	No	No	Often

20	Male	Employee	No	University/Tertiary(incomplete)	Sport/Naked	Every day	No	No	Often
25	Male	Building doorman	No	University/Tertiary(incomplete)	Urban standard	few days a month	No	No	Never
25	Male	Student and Employee	No	University/Tertiary(incomplete)	Sport/Naked	Every day	No	No	Often
24	Female	Student and babysitter	No	University/Tertiary(incomplete)	CUB	Almost every day	No	No	Sometimes

Table A3. Description of participants. Group 3. Motorbike Workers / adult people (Buenos Aires)

Age	**Sex**	**Occupation**	**Have children**	**Education**	**Motorbike Type**	**Motorbike Frequency**	**Crashes (two-last months)**	**Fines**	**Speeding frequency (Self-reported)**
39	Male	Delivery	Yes	University/Tertiary(incomplete)	Enduro/cross/trail	Every day	No	Yes	Rarely
34	Female	Employee/ Delivery	Yes	Secondary(complete)	CUB	Almost every day	No	No	Never
45	Male	business, logistics sector	Yes	Secondary(complete)	CUB	Every day	Yes, without damage or injuries	Yes	Often
40	Male	Delivery	Yes	Secondary(complete)	CUB	Every day	No	No	Rarely
45	Female	Delivery	Yes	Secondary(complete)	CUB	Every day	Yes, with damage or injuries	No	Never
49	Female	Employee and Delivery	Yes	University/Tertiary(incomplete)	Scooter	Two-three days a week	Yes, without damage or injuries	No	Never
43	Male	Employee and Delivery	Yes	University/Tertiary(incomplete)	CUB	Almost every day	No	No	Rarely
33	Female	Employee and Delivery	Yes	University/Tertiary(incomplete)	Urban standard	Almost every day	No	No	Often

Table A3. Description of participants. Group 3. General Population / adult people (Buenos Aires)

Age	Sex	Occupation	Have children	Education	Motorbike Type	Motorbike Frequency	Crashes (two-last months)	Fines	Speeding frequency (Self-reported)
39	Male	Administrative employee	Yes	University/Tertiary(complete)	Sport/Naked	Almost every day	No	Yes	Rarely
31	Male	property renter	No	University/Tertiary(incomplete)	Sport/Naked	Every day	Yes, with damage or injuries	Yes	Sometimes
33	Male	Technical support	No	University/Tertiary(incomplete)	Urban standard	Every day	No	Yes	Never
41	Female	Employee	Yes	Secondary(complete)	Urban standard	Almost every day	No	No	Rarely
44	Female	Teacher	No	University/Tertiary(complete)	Enduro/cross/trail	Two-three days a week	No	No	Never
38	Female	Radiographer	Yes	University/Tertiary(complete)	Urban standard	Every day	No	Yes	Sometimes
41	Male	Blacksmith	Yes	University/Tertiary(complete)	Urban standard	Almost every day	No	Non response	Sometimes
41	Male	Teacher	No	University/Tertiary(complete)	Sport/Naked	Every day	No	Yes	Sometimes

Table A5. Description of participants. Group 5. Motorbike Workers / young people (Córdoba)

Age	Sex	Occupation	Have children	Education	Motorbike Type	Motorbike Frequency	Crashes (two-last months)	Fines	Speeding frequency (Self-reported)
29	Female	Delivery	No	Secondary(complete)	CUB	Almost every day	No	No	Rarely
29	Male	Delivery	Yes	Secondary(complete)	Urban standard	Almost every day	No	No	Never
29	Female	Employee and Delivery	Yes	Secondary(complete)	CUB	Every day	Yes, without damage or injuries	Yes	Rarely
26	Female	Delivery	No	Secondary(complete)	CUB	Almost every day	No	Yes	Rarely

21	Female	Delivery	No	Secondary(complete)	Urban standard	Every day	No	No	Sometimes
21	Male	Delivery	Yes	Secondary (incomplete)	Urban standard	Almost every day	No	No	Sometimes
26	Female	Delivery	No	University/Tertiary(incomplete)	More than one type	Every day	No	No	Often
26	Female	Delivery	No	Secondary(complete)	Urban standard	Every day	No	No	Often

Table A6. Description of participants. Group 6. General Population / young people (Córdoba)

Age	Sex	Occupation	Have children	Education	Motorbike Type	Motorbike Frequency	Crashes (two-last months)	Fines	Speeding frequency (Self-reported)
26	Male	Hairdresser	No	Secondary (incomplete)	Urban standard	Every day	Yes, with damage or injuries	Yes	Never
26	Male	Employee	No	Secondary (incomplete)	Urban standard	Every day	No	No	Sometimes
25	Male	Employee	No	Secondary(complete)	Urban standard	Almost every day	No	No	Rarely
26	Female	Administrative secretary	Yes	University/Tertiary(complete)	Other	Almost every day	No	No	Sometimes
29	Female	Chef	No	University/Tertiary(complete)	Urban standard	Almost every day	No	No	Sometimes
25	Male	Employee	No	University/Tertiary(incomplete)	CUB	Every day	No	No	Never
27	Female	Administrative secretary	No	Secondary(complete)	Enduro/cross/trail	Every day	No	No	Never
29	Female	Housewife	Yes	University/Tertiary(incomplete)	CUB	Two-three days a week	No	No	Rarely

Table A7. Description of participants. Group 7. Motorbike Workers / adult people (Córdoba)

Age	Sex	Occupation	Have children	Education	Motorbike Type	Motorbike Frequency	Crashes (two-last months)	Fines	Speeding frequency (Self-reported)

49	Female	Delivery	Yes	Secondary (incomplete)	CUB	Every day	No	No	Never
46	Male	Delivery	Yes	University/Tertiary(incomplete)	CUB	Every day	No	No	Rarely
43	Female	Delivery	Yes	Secondary (incomplete)	CUB	Every day	No	No	Never
36	Female	Delivery	No	Secondary(complete)	CUB	Every day	No	No	Rarely
41	Male	Delivery	No	University/Tertiary(complete)	Urban standard	Every day	Yes, with damage or injuries	No	Sometimes
37	Male	Delivery	Yes	Secondary(complete)	CUB	Every day	No	No	Rarely
36	Male	Delivery	No	University/Tertiary(complete)	CUB	Every day	No	No	Rarely
31	Male	Delivery	Yes	University/Tertiary(incomplete)	Urban standard	Almost every day	Yes, without damage or injuries	Yes	Sometimes

Table A8. Description of participants. Group 8. General Population / adult people (Córdoba)

Age	Sex	Occupation	Have children	Education	Motorbike Type	Motorbike Frequency	Crashes (two-last months)	Fines	Speeding frequency (Self-reported)
40	Male	Employee	Yes	University/Tertiary(incomplete)	Urban standard	Every day	No	No	Rarely
36	Female	Employee	Yes	Secondary(complete)	Urban standard	Almost every day	No	No	Sometimes
45	Female	self-employed worker	Yes	University/Tertiary(complete)	CUB	Two-three days a week	No	No	Never
44	Male	Employee	Yes	University/Tertiary(incomplete)	CUB	Almost every day	No	No	Rarely
42	Male	Metallurgical	Yes	Secondary(complete)	CUB	Every day	No	No	Sometimes
42	Male	Employee	Yes	Secondary(complete)	Chopper/Cruiser	few days a month	No	No	Sometimes
47	Male	computer scientist	Yes	University/Tertiary(complete)	Urban standard	Almost every day	No	No	Sometimes

35	Female	Housewife	Yes	Secondary(complete)	Urban standard	Every day	No	No	Sometimes

Appendix B Questionnaire

1.1 Structured Questionnaire

1. What type of motorcycle license do you have? □ Non-Professional □ Professional
2. What category of motorcycles does your license cover? □ Mopeds up to 50 cc (or four kilowatts for electric motorcycles) □ Motorcycles up to 150 cc (or 11 kW) □ Motorcycles over 150 cc (or over 11 kW)
3. Why do you use your motorcycle? (choose the two main reasons) □ Work □ Family mobility □ Personal mobility □ Pleasure
4 How often do you ride your motorcycle? □ Every day or almost every day □ A few days a week □ A few days a month
5. How often do you carry passengers on your motorcycle? □ Never or almost never □ Occasionally □ Frequently
6. Did you experience a crash during the last two years? □ No □ Yes, but without injuries or property damage □ Yes, with property damage □ Yes, with injuries
9. Do you get a traffic ticket for driving your motorcycle during the last two years? □ Yes □ No

10. If you get a traffic ticket, answer why? □ Not to use a helmet □ speeding □ driving under the influence □ Other
11. When and how do you learn to ride a motorcycle?
12. Do you know the posted speed limit on streets? □ 30 km/h □ 40 km/h □ 50 km/h □ Other □ Not sure
13.Do you know the posted speed limit on avenues? □ 50 km □ 60 km □ 40 km □ Other □ Not sure
14. Are there any special speed limits for roads in your city? □ Yes □ No □ Not sure
15. If you answer yes in question 14, which are the special limits you know?
16. Are there specific speed limits for motorcycles? □ Yes □ No □ Not sure
17. If you answer yes in question 16, which are the speed limits for motorcycles?
19. What are the DUI of alcohol limits for motorcyclists in your city? 0 gr/l ☐ 0,2 gr/l ☐ 0,5 gr/l ☐ other ☐ □ Not sure
20. Are there any regulations in your city for riding with adult passengers? □ Yes □ No □ Not sure
21. Are there any regulations in your city regarding riding with child passengers? □ Yes □ No □ Not sure
22. If you answer yes to question 21 or 22, what does this regulation establish?

Appendix C

Focus Group Interview Script

Discussion Guide (1h 30')

Topic 1: Evaluation of risky behaviors

The evidence suggests that motorcyclists are the most likely to exceed speed limits and have the highest number of fatal crashes due to speeding.

- What are your thoughts on this, and why do you think this happen?
- Are the existing speed limits safe enough according to you?
- How do you feel about risk taking when you exceed the speed limit?

- What benefits and advantages does speeding offer to your mobility? (such as reduced travel time, etc.)
- What disadvantages can arise from speeding? (traffic tickets, crashes, injuries, etc.)

The evidence suggests that not wearing a helmet/DUI are risk factors for severe injuries in motorcyclists. However, not every person wears a helmet/avoid DUI.

- What are your thoughts on this, and why do you think this happen?
- How do you feel about risk when you do not use your helmet/DUI?
- What benefits and advantages does helmet use offer to you?

- **Follow-up Probes:**
  - Ask for examples if needed
  - Ask for further explanation if needed

Topic 2: Risk perception

Motorcycle drivers are exposed to various sources of risk arising from road conditions, the behavior of other users, and/or their own behavior.

- What factors make you feel unsafe on the road while driving your motorcycle?
- What is your strategy to drive safely and stay alive?
- Do you feel in danger when you ride your motorcycle above the speed limits/not wearing a helmet/driving under the influence/ride with multiple passengers?
- Do you think that some behaviors are riskier than others (speeding, distraction, DD, helmet use)?
- To what extent do you feel exposed to a traffic injury due to speeding/not wearing a helmet/driving under the influence?

- **Follow-up Probes:**
  - Ask for examples if needed
  - Ask for further explanation if needed

Topic 3: Personal experience with risky behaviors (20 minutes)

Each person has its own reasons to take or avoid risk while driving.

- **Main Questions:**
  - Under which circumstances do you usually speed, do not use helmet, DUI?
  - What makes you to comply with speed limits, helmet use, DUI limits? (external factors, internal factors -thoughts and motivation on that-)
  - What do you feel/think when someone else speeds, do not use helmet, DUI?

- **Follow-up Probes:**
    - Ask for examples if needed
    - Ask for further explanation if needed

Topic 4: Normative Beliefs

- **Main Questions:**
    - In your opinion, do motorcyclist in your city usually comply with traffic regulations –posted speed limits, DUI regulations, helmet use-?
    - In your opinion, is there more social tolerance towards any of these risky behaviors: speeding, DUI, not helmet use? Why?
    - What other road users do when you drive above the speed limits, do not use helmet, DUI?
    - What do your friends/family/people important to you think about speeding, DUI, not helmet use?
    - Is there any person that you think is a model for your traffic behavior? Why?

- **Follow-up Probes:**
    - Ask for examples if needed
    - Ask for further explanation if needed

Topic 5. Behavioral change

- Do you believe that risky behaviors (speeding/not wearing a helmet/DUI) can be changed? How?
- In your opinion, what is the most effective initiative for motorcyclist's safety behaviors (e.g. better laws, low speeds in particular areas, car drivers need to be more considerate of motorcyclists, separate lanes, better roads, more police; stricter licensing, etc.)?

- **Follow-up Probes:**
    - Ask for examples if needed
    - Ask for further explanation if needed

Closing

1. **Summary and Final Thoughts**
    - Summarize key points discussed.
    - Ask participants if there is anything else they would like to add.
2. **Thank You and Next Steps**

- Thank participants again for their time and insights.
- Inform them about the next steps (e.g., when they can expect a follow-up or summary of findings).

3. **Contact Information**
    - Provide contact information for any follow-up questions or additional feedback.