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# SHE RIDES: EXPLORING THE TRENDS AND TRIGGERS OF FEMALE RIDE-HAILING IN BRAZIL'S CAPITALS

ELA VAI DE APP: EXPLORANDO TENDÊNCIAS E ESTÍMULOS DO TRANSPORTE SOB DEMANDA FEMININO NAS CAPITAIS DO BRASIL

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## Abstract

It was investigated, through combined factorial methods, how variables related to cost, safety, and convenience impact the use of ride-hailing in Brazil. It is inferred that usage is based on utilitarian and technological factors, with an emphasis on self-preservation. In situations of perceived risk, users adjust their patterns of variable weight according to the time and type of use. The innovative nature of the study can be observed through the proposed explanatory model of behavior, and the theoretical contribution is evidenced by filling the gap regarding the prediction of female consumer behavior in ride-hailing use.

**Keywords**: On-demand mobility. Technological innovation. Women's consumption preferences. App-based transport services.

## Resumo

Investigou-se por meio de métodos fatoriais combinados como variáveis ligadas ao custo, segurança e conveniência impactam o uso do ride-hailing no Brasil. Infere-se que o uso se baseia em fatores utilitários e tecnológicos com ênfase na autopreservação. Em situações de risco percebido, as usuárias ajustam seus padrões de peso das variáveis conforme o horário e o tipo de uso. O caráter inovador do estudo pode ser observado através da proposta de modelo explicativo de comportamento e a contribuição teórica evidencia-se a partir do preenchimento da lacuna a respeito da predição de comportamento de consumo feminino no uso do ride-hailing.

**Palavras-chave**: Mobilidade sob demanda. Inovação tecnológica. Preferências de consumo feminino. Serviços de transporte por aplicativo.

## Introduction

On-demand transportation services operate through digital platforms that connect users for immediate travel needs (Violin et al., 2022) and have revolutionized urban mobility (Dias, 2021). The growth of these technology-based services has been propelled by the widespread availability of the internet and smartphones, leading to increased adoption of on-demand mobility services in Brazil. Research on ride-hailing in the country typically examines local factors and the social, environmental, or technological dimensions individually (Ji et al., 2024). Broader studies, such as those by Violin et al. (2022), have emerged, but they primarily focus on general audiences.

Most international research tends to investigate male or general consumption patterns in both developed (Dorneles Ribeiro et al., 2024) and developing countries (Moody et al., 2021; Flor García et al., 2023). The usage of ride-hailing services by women, however, remains under-explored, highlighting a significant gap in the literature (Violin, 2022).

This study employs exploratory, confirmatory, and principal component analyses to validate indicators previously identified by Violin (2022) in Brazil and others, including Brown & LaValle in EUA, Lesteven & Samadzad (2021) in Iran, and Liu et al. (2022) in China. The research aims to advance theoretical understanding by elucidating usage patterns and determinants of women's consumption of ride-hailing services in a large-scale context, addressing a topic that has been minimally investigated in Brazil.

The innovative aspect of this research lies in assessing women's perceptions regarding motivators for using ride-hailing, focusing on the timing and nature of their use. This analysis suggests that users prioritize utilitarian factors (Brown & LaValle, 2020; Bhatt et al., 2024) facilitated by technology (Dorneles Ribeiro et al., 2024), with particular attention to personal safety, including concerns about moral (harassment) and physical (sexual harassment) integrity. Studies by Gurbuz (2021), Violin et al. (2022), and Liu et al. (2022) also emphasize these aspects of physical and psychological self-preservation.

The central objective of this research is to explore how various influencing factors, combined with the time of day and intended use, affect women's ride-hailing decisions. The study proposes two hypotheses: Women assign different values and concerns to on-demand transportation usage, particularly regarding safety and self-preservation, leading to diverse consumption behaviors. The timing and nature of ride-hailing usage significantly influence decision-making.

The findings of this research are expected to enrich the discourse surrounding related topics, such as activity regulation, urban dynamics, comparisons between transportation modes, and labor relations associated with service provision. The explanatory model developed here allows for connections to both national and international studies on this subject, especially regarding the extensive data collection and robust quantitative analyses that enhance understanding of female consumption behavior in on-demand transportation, laying the groundwork for future research in this area.

## Ride-hailing

Ride-hailing, characterized by urban trips facilitated by privately owned vehicles through digital technology, represents a significant phenomenon in contemporary mobility (Brown & LaValle, 2020). Its expansion is driven by factors such as convenience, reduced fares, peer-to-peer interaction, and connectivity (Violin, 2022), resulting in its global popularization over the past decade. United Nations projections indicate that by 2050, approximately 68% of the global population will reside in urban areas, thereby increasing the demand for transportation solutions (UN News, 2022). Consequently, there is an urgent need to discuss economically viable, socially responsible, and

environmentally sustainable transport modes to mitigate negative impacts such as congestion, emissions, road deterioration, and accident risks (Bhatt et al., 2024; Gunarso, 2023). Technological advancements and enhanced consumer accessibility have driven the growth of shared mobility services in recent years (Violin, 2022), offering tangible benefits such as improved connectivity, door-to-door services, and cost savings for users (Aguilera-García et al., 2022; Bhatt et al., 2024).

Various lines of research currently explore shared mobility, addressing different aspects of the phenomenon. Table 1 provides a synthesis of the main areas of study, excluding specific gender-based usage analysis. For a summary of representative studies related to ride-hailing, irrespective of gender, please refer to Table 1.

**Table 1**

*Areas of Research Concentration Associated with Ride-Hailing*

| Author(s) | Results |
|---|---|
| Etminani-Ghasrodashti & Kermanshachi, 2022 | Indicated that low residential density and privacy concerns negatively impact the frequency of use. |
| Acheampong et al., 2020 | Cost-effectiveness, safety, shared mobility, and technology adoption are key usage factors. |
| Zhang et al., 2023 | Ride-hailing is used primarily for occasional, work, and school trips, with users living primarily in the suburbs. |
| Brown & LaValle, 2020 | Shared transportation networks can affect movement speed and congestion time. |
| Gunarso, 2023 | The service promotes cost and time savings compared to conventional cab services. |
| Violin, 2022 | Addresses the use of electric vehicles and includes analysis of shared transportation services. |
| Rangel et al., 2021 | Determining the usage behavior of shared transportation services in Brazil. |
| Violin et al., 2022 | Association of fares with different explanatory variables and main differences between Uber and cab fares. |
| Agarwal et al., 2022 | Use of transportation services associated with cost reduction, expected benefits, and technological enablers. |
| Aguilera-García et al., 2022 | Price impacts consumption perception. |
| Liu et al., 2022 | People in general are open to technological innovation and favor market opening. |
| Sedighi et al., 2021 | Traveling with companions significantly enhances female passengers' perceived safety. |
| Noor & Iamtrakul, 2023 | Highlights the importance of gender-sensitive transportation policies. |

*Source: Authors cited in the table.*

The multiplicity of themes addressed by these studies highlights the complexity and multifaceted nature of ride-hailing services, which can be framed within social, environmental, economic, and, more recently, technological dimensions. Considering the escalation of research on a global scale, the relevance of a deeper understanding of this area is exponentially increasing (Zhang et al., 2023). The body of work presented has focused on general analyses without specific attention to gender, usage situations, or moments of use, suggesting an area that needs exploration to robustly understand the experiences and needs of female users.

The study by Acheampong et al. (2020) signals the need for the development of policies to standardize safety features and cost transparency. Both Etminani-Ghasrodashti and Kermanshachi (2022), and Noor and Iamtrakul (2023) indicate the potential for urban planners to design integrated means to facilitate traffic flow and incorporate ride-hailing into this dynamic.

Agarwal et al. (2022) and Aguilera-García et al. (2022) suggest refining pricing strategies, communication campaigns, and targeted service offerings to enhance user satisfaction. Meanwhile, Liu et al. (2022) and Zhang et al. (2023) highlight public openness to technological innovations in ride-hailing services, encouraging continuous innovation in app features, vehicle technologies, and integration with other smart city initiatives, ensuring that ride-hailing services remain at the forefront of

urban mobility solutions.

From a theoretical perspective, these studies indicate that lifestyle, attitudes towards technology, and consumption relationships influence consumer behavior. For example, Sedighi et al. (2021) and Rangel et al. (2021) contribute to this understanding, complemented by Agarwal et al. (2022), who studied technology adoption processes related to transportation. Studies like those of Violin (2022) and Gunarso (2023) further highlight consumption drivers and their associations with the dynamics of urban mobility through ride-hailing.

**Women and on-demand displacement**

Women exhibit more intricate travel patterns in urban environments, primarily due to their involvement in unpaid activities, caretaking responsibilities, and employment obligations. Consequently, they tend to rely more on public transportation, which often entails limitations in travel speed and accessibility to motor vehicles, even when their families possess private cars (Mowri & Bailey, 2024). Additionally, women face longer waiting times within the overall mobility structure, especially during peak hours or when attending commitments that deviate from their regular travel patterns (Violin et al., 2022).

Particularly for women with lower family incomes, the use of slower modes of transportation with restricted schedules and lower quality compared to their male counterparts is common. This includes a greater reliance on walking and public transport, with the added burden of facing moral and/or sexual harassment, contributing to feelings of insecurity (Porrazzo et al., 2022). The perception of risk differs between men and women, influenced by social conditions, potential risk situations, and other factors that contribute to the "feeling of insecurity" experienced by women (Patel et al., 2023). In Latin America, public transportation systems may exhibit informal characteristics, including undefined stops and a lack of protocols and security measures to address crimes, including various forms of harassment (World Bank Group & UFGE, 2020). Consequently, higher rates of sexual harassment and assaults have been observed in such contexts (Hu & Yang, 2024).

The ride-hailing industry, despite offering alternatives, is not exempt from crime-related situations. Concerns over harassment and aggression, including sexual harassment, have been reported, generating apprehensions among female users and leading to the development of strategies to mitigate or avoid insecurity risks or criminal acts against women (Dai & Tang, 2020; Violin, 2022).

Women tend to engage in more travel than men, as they not only fulfill work-related obligations but also frequently take on unpaid responsibilities within their families and social circles, as well as allocate time for leisure activities (Mowri & Bailey, 2024; Sabogal-Cardona et al., 2021). For women living near safe and optimized means of travel in terms of time and boarding options, participation in the labor market is facilitated due to improved perceptions of safety and the ability to balance their multiple roles (Noor & Iamtrakul, 2023).

Women also face more restrictions than men on their ability to travel. These include accessibility, vehicle access, personal safety issues, and, in some countries, social norms regarding independent movement. This not only limits women's income-generating opportunities but also restricts development and social mobility by limiting their access to health, education, and other services for themselves and the children or family members they care for (International Finance Corporation [IFC], 2018).

Considering the multiplicity of variables, we assembled a state-of-the-art review of studies involving female ride-hailing, presented in the two subsequent charts: the first related to international studies (*Table 2*) and the second focused on national studies (*Table 3*).

**Table 2**

*Inducers of Ride-Hailing Use by Women – International Studies*

| Author(s) | Referral | Factor |
|---|---|---|
| Etminani-Ghasrodashti & Kermanshachi, 2022 | Explores the factors that affect an on-demand transportation service. | Higher safety perception related to ride-hailing. |
| World Bank Group & UFGE, 2020 | There is a need to work near your residence or have easy access to transportation. | Reduction of barriers in time and place of boarding. |
| Zhou et al., 2025 | Influence of travel frequency and its structure on commuting mode choice. | Improved fueling conditions may be an element of attraction. |
| Gurbuz, 2021 | Gender gap analysis in the ride-hailing industry. | Concerns about their safety make it difficult for women drivers to enter the platforms. |
| Porrazzo et al., 2022 | Gender-sensitive planning is necessary to optimize sustainable mobility systems. | Planners focus on equality over equity and avoid discussing gender inequality. |
| Noor & Iamtrakul, 2023 | Highlights the importance of gender-sensitive transportation policies to improve women's safety and access. | Analyzes the political constraints hindering effective implementation of measures against sexual harassment. |
| Flor García et al., 2023 | Fatal traffic accidents due to drunk driving and fatalities. | Risk to life associated with deaths and intoxication. |
| Mowri & Bailey, 2024 | Expansion of the debate on gender and mobility beyond the focus on cars and public transportation. | Women's resistance proportional to social acceptance. |
| Hu & Yang, 2024 | Regulating driver behavior, monitoring vehicles, and enhancing app security, with emergency protocols. | Women's safety through protocols. |

*Source: Authors cited in the table.*

The table illustrates international studies that address the theme of ride-hailing services targeted toward women. It highlights important dimensions such as women's physical and psychological safety, as exemplified by studies from Hu and Yang (2024). Additionally, it includes indicators of women's perceptions of safety, explored by Noor and Iamtrakul (2023), who investigate how safety perceptions influence the choice of on-demand transportation.

Moreover, gender barriers studied by Gurbuz (2021) emphasize the entry of women as drivers and their concerns regarding their own safety. These findings indicate theoretical benchmarks in the field of consumer behavior, highlighting concerns about the safety and integrity of on-demand mobility services. This underscores a practical contribution aimed at guiding initiatives related to the safety and accessibility of ride-hailing services for women.

**Table 3**

*Inducers of Ride-Hailing Use by Women – National Studies*

| Author(s) | Notes | Focuses on women? |
|---|---|---|
| Carvalho, 2019 | It gains relevance for female users to be able to choose the gender of who drives. | Partially |
| Munchen & Miyamoto, 2020 | Women have become more likely to use ride-hailing to commute to work. | Partially |
| Miranda, 2020 | Use based on trust, price, quality, and socialization. | Partially |
| Costa et al., 2022 | Travel behavior changes may persist and influence future sustainable transport policies. | Partially |
| Bezerra, 2021 | Precarious work of women drivers. | Yes |
| Pereira et al., 2021 | More private cars, fewer public buses, especially in smaller cities and among low-income groups. | Partially |
| Warwar & Pereira, 2022 | Ride-hailing is more commonly used by high-income individuals, young people (15–34), women, and whites. | Partially |
| Souza et al., 2021 | Ride-hailing (RH) complements public transport in balanced areas but replaces it in unequal ones. | Partially |

*Source: Authors cited in the table.*

National research presents studies with limited territorial scope and small sample sizes. The themes studied in Brazil include the choice of driver's gender (Violin et al., 2022) and the discussion of the social and cultural role of female drivers (Warwar & Pereira, 2022). Furthermore, Nourani et al. (2020) emphasize safety as a significant driver of demand for this mode of transportation in the country. These studies indicate a theoretical need for expanding and structuring the understanding of consumption determinants, signaling to both public and private sectors the need to discuss policies and actions aimed at mitigating women's perceptions of insecurity.

Safety emerges as a distinctive factor in the use of ride-hailing services by women in Brazil, as underscored by studies like those by Souza et al. (2021). National studies offer a localized perspective on the motivations and specific challenges faced by Brazilian women when using ride-hailing services, contributing to the understanding of cultural and social dynamics. The two tables highlight the current gap in information regarding the drivers of female consumer behavior in Brazil, fundamentally linked to inclusive structures. However, they do not provide an in-depth exploration of the theme.

## Methodological Procedures

The methodology employed was supported by three probabilistic procedures that guided the data collection process. These encompassed the sample size, the determination of data collection locations, the definition of the target audience, and the specification of periods, times, and the structure for data collection and analysis.

The first step involved excluding elements not relevant to the target sample group, based on the use of a Sampling Grid (Taherdoost et al., 2022). The sample consisted of women over 18 years of age, approached at ride-hailing pickup and drop-off locations, identified through persistent observation of vehicle movements, repeated smartphone consultations, and the identification of vehicles associated with ride-hailing services.

Subsequently, Systematic Sampling was employed to maximize the inclusion of harmoniously participating subjects (Matos & Rodrigues, 2019). According to this method, every third qualified subject was invited to participate in the interview, monitored during sequences of three successive ride-hailing pickups or drop-offs.

Cluster Sampling was then utilized to determine the primary locations where services occurred, thus informing the sample size. The flow of pickups at each sampling point—including hotels, airports, bus terminals, shopping centers, events, commercial centers, and tourist attractions—was measured for one hour during three different periods of the day (morning, afternoon, and evening), initially in five Brazilian capitals—Rio de Janeiro, Porto Alegre, Goiânia, Palmas, and Aracaju—between October 2023 and March 2024, serving as a pre-test stage. These procedures were later replicated in other cities.

The selection of these capitals was motivated by their high volume of ride-hailing activity and the availability of diverse sampling points, ensuring regional representation across Brazil. Data collection was conducted between April and September 2024 in the following cities:

- a) Southeast: São Paulo, Rio de Janeiro, Belo Horizonte;
- b) South: Curitiba, Florianópolis, Porto Alegre;
- c) Central-West: Campo Grande, Cuiabá, Goiânia;
- d) North: Manaus, Belém, Palmas;
- e) Northeast: Salvador, Fortaleza, Recife, Aracaju; and
- Federal District: Brasília.

On average, 18 pickups per hour were observed at each sampling point, based on the study's methodological design of one hour of observation per location. Consequently, 128 interviews per city

were conducted across seven sampling points, totaling 2,176 valid samples, including pre-test data. Sample averages stabilized between the 109th and 116th participant, reinforcing the reliability of the variables under analysis. The table below outlines the procedures and their related indicators:

**Table 4**

*Methodological Structure*

| Objective | Procedure | Design | Indicators |
|---|---|---|---|
| Exclusion of irrelevant elements | Sampling Grid | Users over 18 years old approached at service locations | 2,176 qualified sample subjects |
| Maximize subjects with harmonious participation | Systematic Sampling | Approach every third qualified subject | Averages stabilized between the 109th and 116th subject, validating research variables |
| Determine primary service locations | Cluster Sampling | Flow of pickups at sampling points with data collection for 1 hour during usage periods | Average of 18 pickups/hour at high-flow locations: hotels, airports, terminals, shopping areas, etc. |
| Validation of instrument and variables | Pre-test | Test variables of interest, data collection method, sampling points | Pre-test conducted in one capital per region, validating instruments and variables |
| Determine sample size | Sample Composition | Average of 18 pickups/hour × 7 sampling points with every third subject approached | Generation of 128 sample subjects per city; stabilization of averages before reaching this number |

*Source: Prepared by the author.*

This table provides a clear and structured overview of the research methodology and its various components.

To develop the *data collection instrument*, a compilation of relevant studies and key authors was consulted, focusing on the *factors inducing the use of ride-hailing services*, particularly among women. This compilation is presented in the table 5:

**Table 5**

*Outline of Variables in the Research*

| Authors | Factors | Public | Type |
|---|---|---|---|
| Curtis & Mont, 2020; Xu et al., 2024 | Pollutant Reduction | General | Environmental |
| | Reduction of Vehicles | General | Environmental |
| Souza et al., 2021; Porrazzo et al., 2022; Hu & Yang, 2024 | Physical Safety | Female | Social |
| | Psychological Safety | Female | Social |
| World Bank Group & UFGE, 2020; Violin, 2022; Noor & Iamtrakul, 2023 | Technological Availability | General/Female | Technological |
| | Embarkation Convenience | General/Female | Technological |
| | Time Convenience | General/Female | Technological |
| Costa et al., 2022; Noor & Iamtrakul, 2023 | Risk Reduction (drunkenness, fatalities) | Female | Social |
| Bajaj et al., 2020; Violin et al., 2022; Noor & Iamtrakul, 2023; Ji et al., 2024 | Data Security | Female | Technological |
| | Expectation of Benefits | Female | Social |
| Miranda, 2020; Violin, 2022; Aguilera-García et al., 2022 | Quality of Service | General/Female | Economic |
| | Reliability of Service | General/Female | Technological |
| | Reduced Price | General/Female | Economic |
| | Socialization | Female | Social |

*Source: Authors cited in the table.*

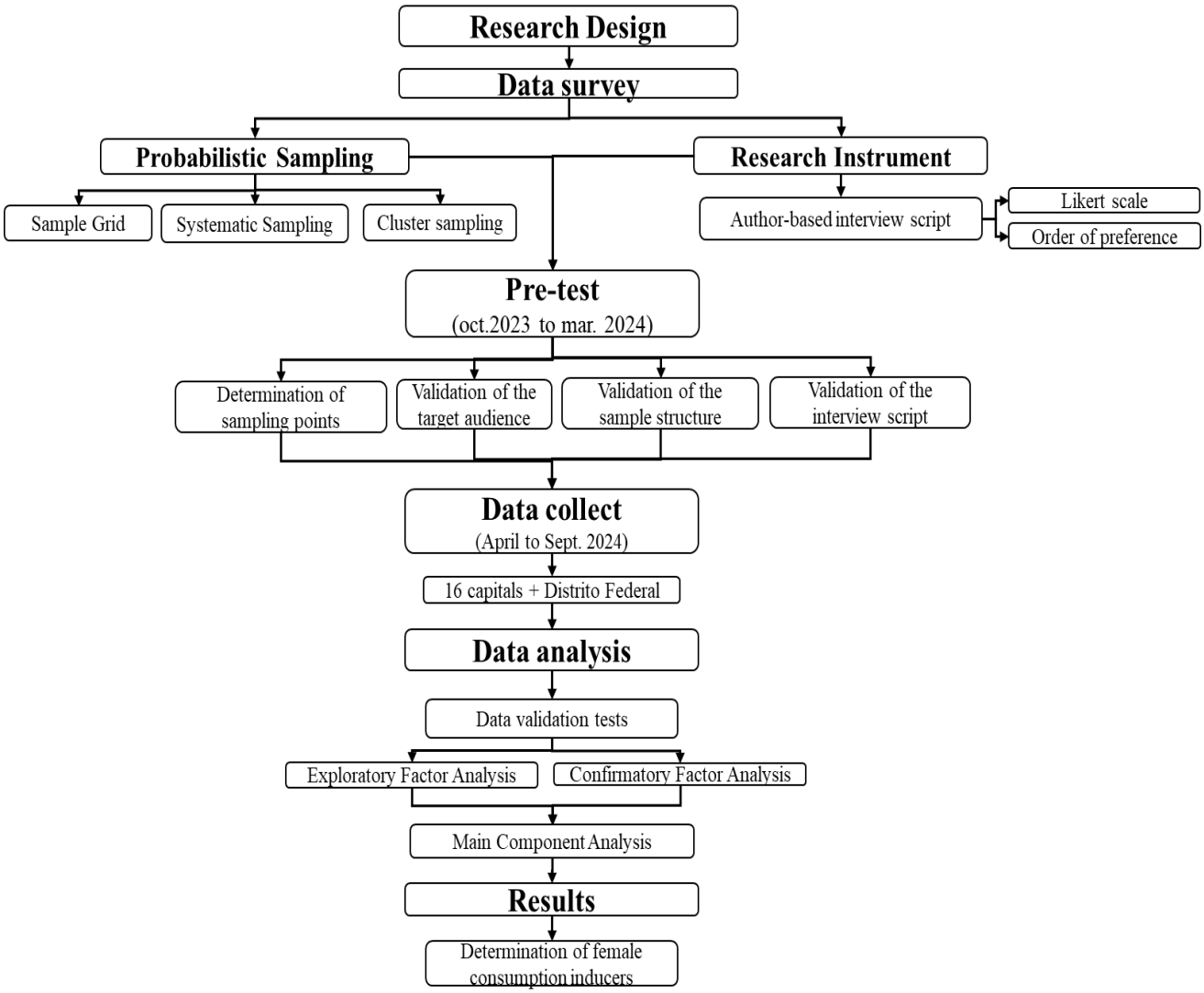
The compilation presented in Table 5 represents a systematized selection of key variables discussed in the literature, forming the basis for the construction of the data collection instrument. A five-point Likert scale was applied, with the order of preference established for variables related to influencing factors, motivators of use, and travel periods. This approach enabled analytical compatibility with the statistical software used and ensured the integrity of the data generated.

To define the explanatory model, a sequence of statistical procedures was adopted. First, Exploratory Factor Analysis (EFA) was conducted to validate the variables and identify a suitable set of underlying dimensions. Next, the usage inducers with the highest internal consistency were subjected to Confirmatory Factor Analysis (CFA). Finally, Principal Component Analysis (PCA) was employed to refine and interpret the results.

All statistical analyses were conducted using IBM SPSS Statistics software. The figure below summarizes the methodological path followed in the study:

**Figure 1**

*Schematic of the research procedures.*




*Source: Author*

As parameters for data validation, KMO and Bartlett's tests were generated, presenting indicators of consistency and reliability. The Kaiser-Meyer-Olkin (KMO) measure of sample adequacy was 0.908, and Bartlett's test of sphericity had an approximate chi-square value of 19,442.489 with 90 degrees of freedom and a significance level of 0.000. Both the KMO measure ($\geq 0.80$) and Bartlett's test (significance $\leq 0.005$) indicated an adequate degree of consistency and reliability of the data (Matos & Rodrigues, 2019), allowing for subsequent analyses.

## Results and Discussions

Regarding the factors influencing female consumption of ride-hailing services, it is important to emphasize the relevance of a comprehensive analysis of the correlated elements that interconnect influencing variables, usage motivators, and travel time periods. This approach allows for the identification and delimitation of consumption drivers and their respective degrees of relevance.

The reliability and consistency of the database were initially ensured through Exploratory Factor Analysis (EFA), based on the total variance explained, as presented in Table 6:

**Table 6**

*Total Variance Explained*

| Components | Initial eigenvalues | | | Extraction of sums of square charges | | Rotation of sums of square charges | |
|---|---|---|---|---|---|---|---|
| | Total | % Variation | % Cumulative | Total | % Variation | % Cumulative | Total |
| 1 | 12,983 | 81,146 | 81,146 | 12,983 | 81,146 | 81,146 | 1 |
| 2 | 1,556 | 9,727 | 90,873 | 1,556 | 9,727 | 90,873 | 2 |
| 3 | 1,037 | 6,484 | 97,358 | 1,037 | 6,484 | 97,358 | 3 |
| 4 | ,200 | 1,250 | 98,607 | | | | 4 |
| 5 | ,084 | ,524 | 99,132 | | | | 5 |
| 6 | ,076 | ,284 | 99,891 | | | | 6 |
| 7 | ,045 | ,109 | 100,000 | | | | 7 |

Note: Extraction method - principal components
Source: Author

The data reveal a substantial set of values related to the total variance explained of the analyzed variables, with three rotated components accounting for 97.38% of female consumption drivers. It is worth highlighting that this analysis follows the acceptance criterion of values ≥ 0.60, as suggested by Matos and Rodrigues (2019), thus validating the variable set. The factor distribution, as shown in Table 7, presents the variable allocation factors along with their communalities and factor matrix values:

**Table7**

*Communalities, factor matrix, and factor allocation*

| Indicators | Price Reduction | Expectation of Benefits | Technological Availability | Shipping Convenience | Time Convenience | Risk Reduction | Psychological Safety | Physical Safety | Socialization | Reduction of pollution | Reduction of vehicles | Service Confidence | Data security | Quality of service |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Communalities** | ,742 | ,755 | ,801 | ,722 | ,744 | ,844 | ,789 | ,799 | ,837 | ,212 | ,195 | ,333 | ,428 | ,284 |
| **Factor Matrix** [a] | ,895 | ,814 | ,866 | ,872 | ,847 | ,881 | ,892 | ,877 | ,617 | ,474 | ,397 | 298 | 417 | 468 |
| **Factors** [b] | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 3 |

Note: [a] Rotation Method: Varimax / [b] Factorial Categorization to which the variable belongs.
Source: Author

In the field of communalities, values ≥ 0.500 are recommended according to the specialized literature. Likewise, the factor matrix must contain values ≥ 0.60, indicating the variables that should compose

the analysis, while elements that do not meet at least one of these conditions are excluded (Taherdoost et al., 2022).

Tables 6 and 7 reveal the identified consumption drivers as: *Price Reduction, Expectation of Benefits, Technological Availability, Boarding Convenience, Time Convenience, Risk Reduction, Psychological Safety, Physical Safety,* and *Socialization.* Each item demonstrated an appropriate level in terms of reliability, according to the parameters typically considered acceptable in the Applied Social Sciences (Schroeders et al., 2022).

To consolidate the analytical structure, Confirmatory Factor Analysis (CFA) was conducted to validate the set of variables associated with the central object of study. Table 8 presents Model 1, composed of the fourteen analyzed variables, as well as the Modified Model, structured to achieve better adjustment of the elements according to the criteria of the specialized literature (Taherdoost et al., 2022).

**Table 8**

*Comparative data between models*

| Model | **Absolute Adjustment Measures** | | **Incremental Adjustment Measures** | | | **Parsimony-adjusted measures** | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Chi-square (χ2) | RMSEA | CFI | TLI | NFI | PRATIO | PCFI | PNFI | AIC |
| Model 1 | 0,000 | 0,241 | 0,614 | 0,657 | 0,622 | 0,700 | 0,524 | 0,504 | 5744,432 |
| Modified Model | 0,0087 | ,0059 | 0,919 | 0,918 | 0,911 | 0,859 | 0,749 | 0,766 | 2975,871 |

Source: Author

According to the data in the table, Model 1 proves inadequate based on the criteria indicated in the specialized literature. On the other hand, the indicators from the Modified Model reveal elements that demonstrate its adequacy. The likelihood ratio chi-square ($\chi^2 \geq 0.0$) indicates that the distance between the observed matrix and the estimated matrix is acceptable (Matos & Rodrigues, 2019).

Additionally, the Root Mean Square Error of Approximation (RMSEA) with an indicator ≤ 0.060, and the incremental fit indices Comparative Fit Index (CFI), Tucker-Lewis Index (TLI), and Normed Fit Index (NFI), with values ≥ 0.90 (Taherdoost et al., 2022), demonstrate the adequacy of the variable set.

The parsimony indices PRATIO, PCFI, and PNFI, with values ≥ 0.50 (Taherdoost et al., 2022), are also considered satisfactory. Additionally, the Akaike Information Criterion (AIC), which measures the consistency of the modified model, confirms its coherence (Matos & Rodrigues, 2019).

**Table 9**

*Regression weights, variances, and intercepts*

| Variables | **Standardized Weights** | **Regression of Variance** | **Weighted Squared Multiple** | **Correlation of Regressions** |
|---|---|---|---|---|
| Reduced Price | *** | *** | ,722 | ,317 |
| Time Convenience | *** | *** | ,456 | ,455 |
| Risk of Life | *** | *** | ,717 | ,712 |
| Embarkation Convenience | *** | *** | ,774 | ,518 |
| Physical Safety | *** | *** | ,709 | ,742 |
| Psychological Safety | *** | *** | ,799 | ,688 |
| Technological Availability | *** | *** | ,339 | ,466 |
| Socialization | *** | *** | ,421 | ,431 |
| Expectation of Benefits | *** | *** | ,708 | ,566 |

Source: Author

The values presented by the Squared Multiple Correlations indicate that Time Convenience, Technological Availability, and Socialization have moderate importance. Meanwhile, Price Reduction,

Risk to Life, Boarding Convenience, Physical Safety, Psychological Safety, and Expectation of Benefits are factors with higher degrees of relevance in the decision to use ride-hailing services.

Moreover, the Regression Correlations indicate that Price Reduction, Time Convenience, Technological Availability, and Socialization present moderate correlations, whereas Risk to Life, Boarding Convenience, Physical and Psychological Safety, and Expectation of Benefits show high interrelations with the other variables under analysis.

In the overall analysis, it is observed that the regression weights, variances, and correlations indicate that variables related to physical and psychological safety, boarding convenience, and expectation of benefits are robust factors in the decision-making process for service use among women, pointing to strong and consistent predictors of consumption behavior. Despite different degrees, all variables emphasize the relevance of considering various factors that impact on-demand travel. These inferences are supported, wholly or in part, by studies such as Violin (2022), Sabogal-Cardona et al. (2021), Porrazzo et al. (2022), Aguilera-García et al. (2022), Etminani-Ghasrodashti and Kermanshachi (2022), Schroeders et al. (2022), Dorneles Ribeiro et al. (2024), Hu and Yang (2024), and Zhou et al. (2025).

To expand the understanding of the subject, participants were invited not only to indicate the influencing variables in the use of services but also to relate them to usage motives:

(i) Work,
(ii) Fruition (Enjoyment),
(iii) Social Obligations, and
(iv) Compulsory Travel

Additionally, to their periods of use:

(i) Morning,
(ii) Afternoon,
(iii) Evening, and
(iv) Late Night.

The study examined service use and consumption drivers based on time and usage mode, using Principal Component Analysis to generate explanatory figures that illustrate the relationship between variables, usage motives, and time of day.

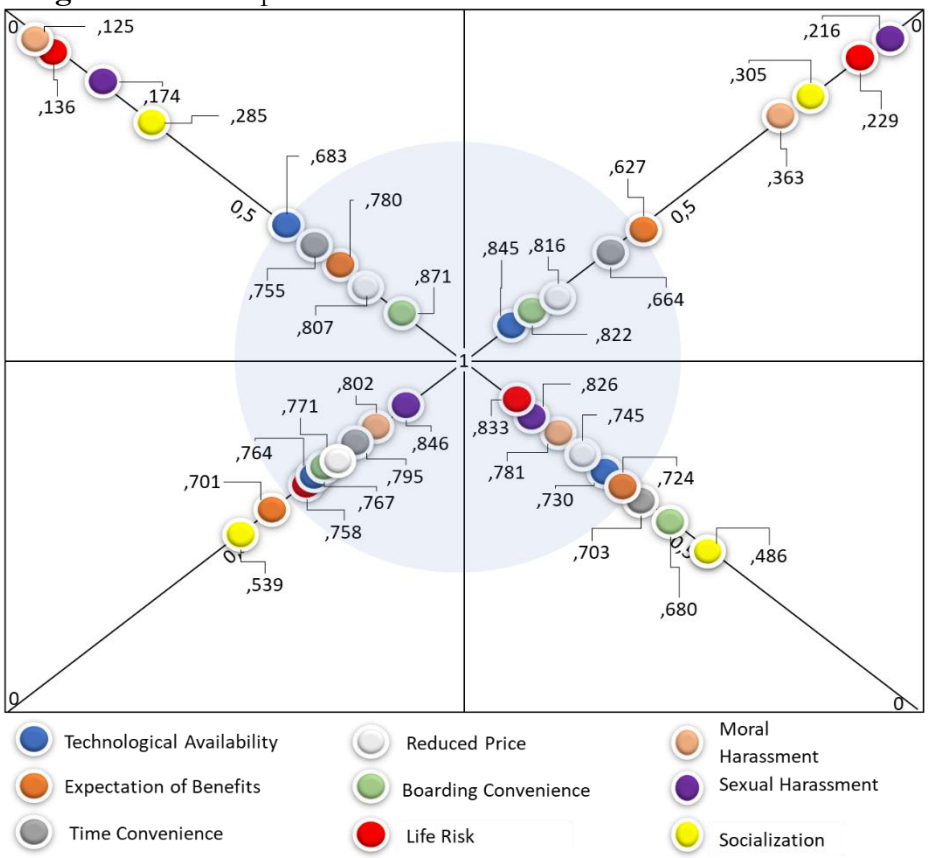
In the initial context, considering trips related to Work, Distinct Responsibilities, and Social Obligations, greater frequency of use is observed during the day, especially during business hours, except for the dimension Social Obligations.

During the night and late-night periods, these dimensions become less frequent, reducing the importance of the variable Risk to Life, while factors such as cost, technological accessibility, and expectation of benefits prevail.

Except for the Work dimension, the other types of travel generally involve family members or reference groups, which may contribute to reduced concern with issues related to harassment. These results are supported by Sabogal-Cardona et al. (2021), Violin (2022), Taherdoost et al. (2022), Hu and Yang (2024), and Zhou et al. (2025).

The last analyzed dimension refers to usage for the purpose of enjoyment (fruição), as illustrated in Figure 2.

**Figure 2:** Consumption drivers – Leisure Dimension. Source: Authors




In this dimension, variables are distributed differently from the previous ones, as they involve travel for personal consumption and enjoyment. During the night, users show greater concern with harassment, and the variable Risk to Life becomes more significant. On the other hand, this same usage motive at other times of the day does not highlight such concerns as relevant. These findings are supported by Aguilera-García et al. (2022), Guzman et al. (2023), and Ji et al. (2024).

Variables related to physical and psychological safety gain prominence at night compared to aspects such as cost, expected benefits, and digital facilitators. This inference is supported by studies such as Miranda (2020), Noor and Iamtrakul (2023), Violin et al. (2022), and Dorneles Ribeiro et al. (2024).

Women demonstrate similar usage drivers to those of other user groups in terms of the relevance of factors such as cost reduction, expectation of avoiding parking fees and overcrowding, as well as the appreciation of technological convenience. These common consumption foundations are evident in the studies by Violin et al. (2022), Noor and Iamtrakul (2023), and Hu and Yang (2024).

However, there are asymmetries in relation to specific usage periods, especially during the night and late night. Although these do not represent the highest volume of use, such periods require attention. Studies such as Miranda (2020), Violin (2022), Etminani-Ghasrodashti and Kermanshachi (2022), Noor and Iamtrakul (2023), and Zhou et al. (2025) also support this inference.

In these contexts, concerns related to physical and psychological integrity and threats to life, especially associated with alcohol consumption, become more evident during enjoyment-related nighttime activities. These findings are supported by Porrazzo et al. (2022), Violin et al. (2022), and Hu and Yang (2024).

In general, the foundational structure of ride-hailing use among the interviewed women is composed of financial variables supported by digital elements and female-related safety concerns, as pointed out by Curtis and Mont (2020), Violin (2022), Guzman et al. (2023), and Patel et al. (2023).

The variable Socialization, although validated, does not show significant importance across different usage scenarios, except for nighttime leisure. In this context, shared use with members of the social circle is noted as a way to reduce costs and perceived risk. Though indirectly, this observation finds support in Gurbuz (2021), Flor García et al. (2023), and Dorneles Ribeiro et al. (2024).

## Conclusion

The topic of ride-hailing has become increasingly consolidated as a point of interest in both developed and developing countries, due to its influence on urban dynamics, modal choices for travel, and transportation consumption patterns. Regarding female mobility, there are observable similarities in usage patterns compared to the general public, particularly concerning cost, technological facilitators, and personal interests related to expected benefits.

However, the study revealed asymmetries in female usage compared to other groups, especially in terms of physical and psychological integrity, as well as self-preservation perceptions, with particular emphasis on specific time periods—most notably at night. This inference highlights the subjective dimension of risk as perceived by women, which directly influences their consumption behavior.

Thus, it can be inferred that the variables influencing consumption are not static. Individual usage motivators emerge as robust elements in the decision-making process and may be activated differently depending on the reason and time of use. This suggests that cost may carry different weight for women compared to perceived risks, and that such perceptions are shaped by situational, social, and temporal factors—thereby supporting the initial hypothesis.

Additionally, the results provide relevant empirical evidence for the formulation of public policies and private strategies aimed at promoting safer and more equitable urban mobility, particularly for female users in contexts marked by perceived vulnerability. Considering that consumption drivers may vary according to individual perceptions, and that personal motivators reinforce the structure of trip-making, it is concluded that adapting ride-hailing services to women's specific demands may enhance both the reach and adherence to this mode of transport.

From a theoretical standpoint, this study contributes to the literature by expanding the understanding of ride-hailing consumption determinants from a female perspective, integrating psychosocial, temporal, and contextual factors into a robust analytical model. This approach broadens classical frameworks on technology adoption and modal choice by incorporating subjective and situational dimensions often overlooked in traditional literature.

In practical terms, the findings underscore the need to personalize on-demand mobility services, with a focus on users' safety perceptions and the adaptation of available features to different usage purposes—such as leisure-driven, obligatory, or supplementary travel. This orientation may benefit both the public sector, in terms of policy formulation, and the private sector, through the redesign of functionalities and the implementation of mechanisms to mitigate women's perception of vulnerability.

As an agenda for future research, it is recommended to deepen the intersectional analysis of risk perceptions, incorporating variables such as age, ethnicity, income, and sexual orientation. Moreover, longitudinal investigations may help capture changes in perceptions and usage patterns over time, particularly in contexts of technological transformation or urban crises.

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