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Surveying public perceptions of urban mobility in a medium-sized city in Brazil: a case study of Divinópolis

György Csomós[1, CDFMR], Franciele Marques da Cunha[2, CFMR]

[1]*University of Debrecen,* Faculty of Engineering, Department of Civil Engineering, Debrecen, Hungary, e-mail: csomos@eng.unideb.hu, https://orcid.org/0000-0003-2487-4450; [2]*University of Debrecen,* Doctoral School of Earth Sciences, Debrecen, Hungary, e-mail: franmarques@mailbox.unideb.hu

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Abstract. Due to urban sprawl and the increase in the number of motorized vehicles, even medium-sized cities are now struggling with mobility problems that primarily affected large cities. In response, cities in Brazil were required to create an urban mobility plan to promote more sustainable modes of transportation. The limited public participation in the development of such plans, combined with often inadequate infrastructure and safety concerns, might contribute to negative perceptions of urban mobility and discourage the use of sustainable transportation alternatives to private cars in Brazilian medium-sized cities. To explore this, we used a questionnaire survey to investigate whether residents of Divinópolis, a medium-sized Brazilian city, participated in the creation of an urban mobility plan and how they perceive urban mobility, focusing on public transportation, active modes of transportation (i.e., walking and cycling), and smart solutions in urban transportation. The results show that respondents are generally dissatisfied with urban mobility in Divinópolis, highlighting the quality of transportation services and infrastructure as the main problems. Overall, these problems prevent people from using transportation modes other than cars. The findings highlight the importance of involving people in the preparation of local mobility plans, as well as improving the quality and infrastructure of public transportation and active modes of transportation.

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1. Introduction

Brazil, one of the largest and most populous countries in the world, is experiencing continuous (although recently slowing) population growth and a high rate of urbanization. Of the country's 211 million inhabitants in 2023 (United Nations, 2024), approximately 194 million (92%) live in urban areas (United Nations, 2018). As reported by numerous studies, Brazilian cities face several serious urban and social problems that threaten people's health and well-being and the cities' prosperity. These problems include air pollution (Arbex et al., 2009; de Miranda et al., 2012; Leão et al., 2023), the strengthening of the urban heat island effect (Souza et al., 2016; Amorim & Dubreuil, 2017; Lapola et al., 2019), poverty and social marginalization (Sawaya et al., 1995; Wacquant, 2008), violence and crimes (Szwarcwald et al., 1999; Macedo et al., 2001; Penglase, 2009; Oliveira et al., 2023), urban sprawl and land use change (Espindola et al., 2017; Ferreira et al., 2019) and inadequate transportation (Ang et al., 2020; Rabay et al., 2021; Pitombo et al., 2024). Among these problems, urban transportation is often considered one of the most significant, as it affects everyone in the city, regardless of their socio-economic status or location in the city.

The rapid growth in use of motorized vehicles (Isler et al., 2024) puts pressure on urban transport infrastructure, which is further exacerbated by poor conditions for other transportation modes, such as public transportation, walking and cycling (Hino et al., 2014; de Sá et al., 2016; Freitas & Maciel, 2017; Lima et al., 2024). Researchers predominantly focus on examining urban transportation and mobility in large metropolises, such as Belo Horizonte (Basu & Alves, 2019; Rudke et al., 2021; Oliveira et al., 2023), Campinas (de Oliveira, 2023; Violato et al., 2014), Curitiba (Lindau et al., 2010; Fryszman et al., 2019; Procopiuck et al., 2021), Recife (De Lima et al., 2017; Wanini Gonçalves De Araújo et al., 2020), Rio de Janeiro (Fontoura et al., 2020; Morais Lemos et al., 2021; Cavojsky, 2023) and São Paulo (de Vasconcellos, 2005; Hidalgo, 2009; Fontoura et al., 2019; Luz et al., 2022), and various governments are also striving to improve mobility in these cities. The obvious reason for the bias towards large metropolises is that they are home to millions of people (Gilbert, 1995; Chiquetto et al., 2022), accommodate the headquarters of numerous multinational companies and national and international organizations (Csomós, 2017), often host cultural and sporting megaevents (Curi et al., 2011, Grix & Lee, 2013) and hold important positions in the national economy (IBGE, 2020).

However, according to 2022 census data, only 19.2 percent of the population in Brazil lives in 15 metropolises with over 1 million inhabitants, while almost one fourth of the population is located in 251 cities with a population of 100,000–500,000 inhabitants. The latter group of cities with a regional role in the national urban system are often referred to as medium-sized cities (Angeoletto et al., 2016; Bolay, 2020; Silveira et al., 2022; Trejo-Nieto, 2024).

A growing body of literature demonstrates that urban problems that previously primarily occurred in large metropolises have recently also affected medium-sized cities. For example, citing Teresina as an example, Espindola et al. (2017) demonstrated that urban sprawl now also characterizes medium-sized cities. Other studies highlight the growing health problems in medium-sized cities, including respiratory diseases such as pneumonia, asthma and lung cancer from air pollution (Nascimento et al., 2006; Amâncio & Nascimento, 2012; Parra et al., 2024) and communicable diseases such as AIDS (Bastos & Barcellos, 1995). Overall, it is repeatedly documented that air pollution from urban transportation, as well as agricultural and industrial production, is becoming a serious problem in small and medium-sized cities (Polezer et al., 2023). Furthermore, Amorim et al. (2024) reported that medium-sized cities are increasingly exposed to extreme urban heat island effects, which are expected to contribute to heightened mortality in these cities. Problems with urban services, such as waste management and healthcare, also occur frequently in this group of cities (Chaves et al., 2012; Fidelis & Colmenero, 2018; Olivo et al., 2023). A study by Filho et al. (2020) shows that homicide mortality rates are constantly increasing in small and medium-sized cities, which highlights a worrying trend regarding safety. Finally, there has recently been a surge in research on urban transportation and mobility in medium-sized cities, including transportation policies and planning (Angeoletto et al., 2019; Bezerra et al., 2020), public transportation (Freitas, 2013; Borchers & Ribeiro, 2022; de Oliveira et al., 2022; Freitas et al., 2023), cycling (Ramos et al., 2020), walking (Rocha et al., 2019) and smart mobility (Cerutti et al., 2019). The striking difference between the largest cities in Brazil and medium-sized cities, however, is that metropolises have been taking steps for decades to overcome the negative effects of urbanization, whereas medium-sized cities are often unprepared for sudden changes.

Against the backdrop, the *Brazilian National Urban Mobility Policy* was introduced in 2012, aiming to "establish guidelines and to support cities in improving accessibility and mobility, ensuring the population the right to an adequate, safe and accessible displacement" (Fontoura et al., 2019). In addition, the Urban Mobility Policy is dedicated to supporting cities to become more sustainable. Under the Urban Mobility Law, cities with over 20,000 inhabitants were required to prepare an urban mobility plan to ensure that urban mobility developments were in line with sustainability goals. However, the implementation of the mobility policy is not without problems, especially in medium-sized cities. For example, in research in medium-sized cities in the State of São Paulo, Bezerra et al. (2020) identified 22 barriers that hinder municipalities in developing and implementing an urban mobility plan. While they found the budget constraint to be the most important barrier, they also concluded that residents should be more effectively encouraged to participate in planning. Similarly, it is well documented in the literature how important and beneficial it is to involve local people in planning the place they live in (see, for example Burby, 2003; Corburn, 2003; Brabham, 2009; Brown & Chin, 2013; Drazkiewicz et al., 2015).

In this research, we conducted a survey to provide insight into how people perceive urban mobility in Divinópolis, a medium-sized city in Minas Gerais. Our goal is to shed light on the factors preventing people from using public transportation and active modes of transportation, and to identify the developments that would make transportation modes other than cars attractive for everyday travel. We will also look at how people perceive safety when traveling in the city and what smart solutions they use or intend to use. This study is guided by the hypothesis that low public involvement in the development of urban mobility plans, along with insufficient infrastructure and safety concerns, may shape negative perceptions of urban mobility and hinder the adoption of sustainable transportation modes over private cars in Brazilian medium-sized cities. Overall, the main objective of the study is to provide guidance to the municipality in rethinking its urban mobility plan. In addition, the research can serve as a useful case study for other medium-sized cities also struggling with mobility problems.

The paper is structured as follows: After the Introduction, we present the data and methods used for the analysis. This section includes the description of the case study area. Then comes the Results section. Following this, we interpret the results in the Discussion section. Finally, we draw the conclusions and formulate policy recommendations.

2. Materials and methods

2.1. Case study area

The city of Divinópolis is located in the south-eastern region of Brazil, as shown in Figure 1. According to the latest data from the Brazilian Institute of Geography and Statistics (IBGE), the city spans an area of 708.115 km², of which only 9.56% is urbanized, and has a population of 231,091 inhabitants (IBGE, 2025).

Due to its strategic size and location, Divinópolis serves as a regional hub for the western part of Minas Gerais (Mello, 2015) and can be accessed via multiple transportation modes. In addition to its road connections, the city is intersected by two railway branches dedicated to freight transport. It also has a local airport, Brigadeiro Antônio Cabral, which currently handles three commercial flights a day and is managed by the Brazilian Company of Airport Infrastructure (Infraero).

As with most Brazilian cities, road transport is the predominant mode of travel within Divinópolis. According to the Ministry of Transport, in December 2024, the cars and motorcycles fleet in Divinópolis consisted of 131,281 registered vehicles, resulting in a motorization index of 57 vehicles per 100 inhabitants, notably higher than the national Brazilian motorization rate of 46 vehicles per 100 inhabitants (Ministry of Transport, 2025). This trend is also observed in other Brazilian medium-sized cities, such as Sobral (Ceará) and Governador Valadares (Minas Gerais), with motorization rates of 50 and 56 vehicles per 100 inhabitants, respectively. Buses are the primary, and often the sole, mode of public transportation in most Brazilian medium-sized cities, including Divinópolis and Governador Valadares. However, Sobral stands out by operating a Light Rail Transit (VLT) system despite its population of just 200,000. This system, implemented in 2014, utilizes the existing rail infrastructure originally designed for freight transport (Governo do Estado do Ceará, 2025).

When it comes to public transportation in Divinópolis, a local survey carried out by the municipality in 2018 showed that, on average, 62,500 passengers use public transportation (buses) on weekdays. To promote increased use of public transportation, the city's *Mobility Plan* includes measures such as the creation of exclusive bus lanes in key ar-

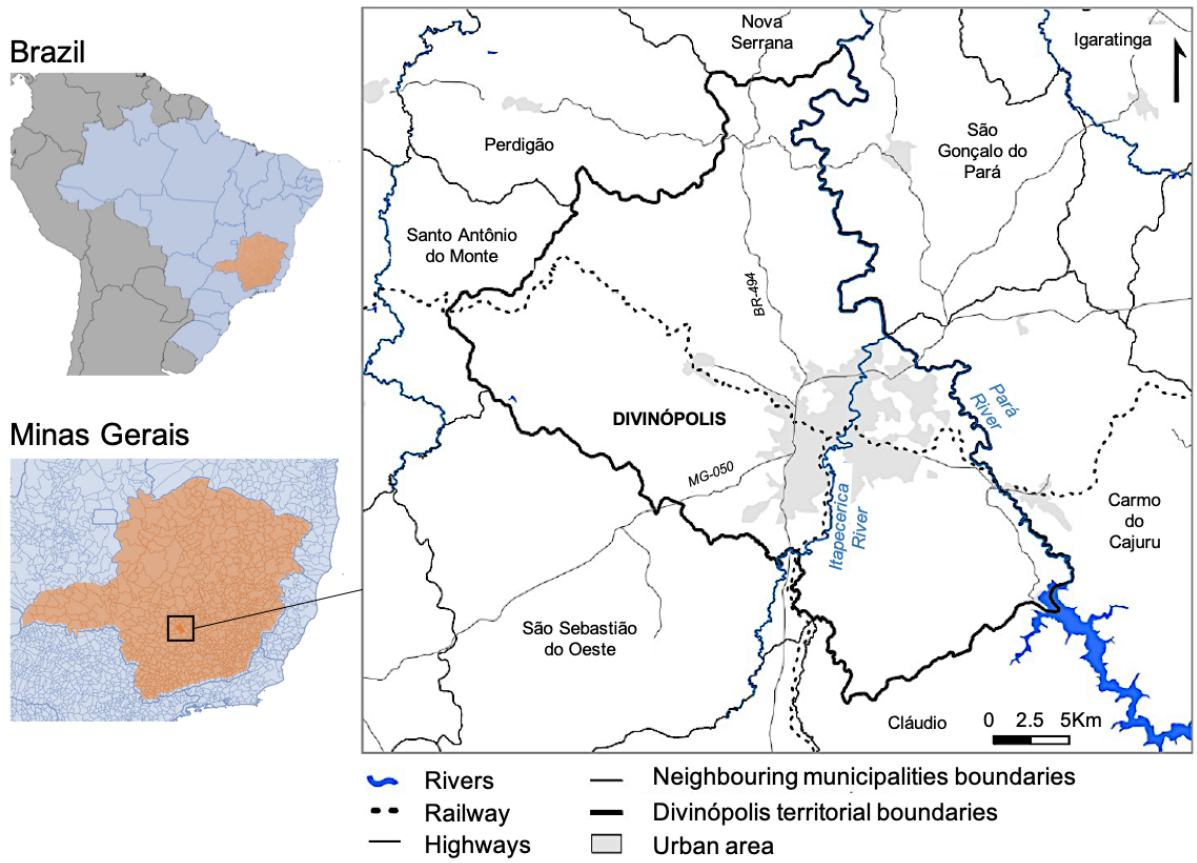

Fig. 1. Divinópolis' location in the south-eastern region of Brazil and central-western region of Minas Gerais
Source: authors' own elaboration based on reference maps made available by the Brazilian Institute of Geography and Statistics – IBGE, 2025

eas and the introduction of smart solutions for trip planning, including a mobile application that allows passengers to purchase tickets, view real-time bus schedules and access route information (Prefeitura de Divinópolis, 2025). These solutions have been gradually implemented since *the Mobility Plan's* approval in 2019; however, no new data have been published to assess whether these measures have led to an increase in daily ridership.

The *Mobility Plan* also proposed a revision of the methodology for determining bus fares in Divinópolis. This review, however, will only take place after a new tender contract is signed in 2027, when the current 15-year contract with the company Transoeste expires. Currently, Divinópolis operates a bus fleet of 150 vehicles, covering an average monthly travel distance of 1 million km. The price of a single bus ticket is 4.15 BRL (~0.67 EUR), which is considered relatively expensive. In comparison, Belo Horizonte, the capital of Minas Gerais with a population of over 2.4 million, operates a fleet of more than 2,000 buses and an average monthly travel distance of 12 million km. Although Belo Horizonte is much larger in population and bus network than Divinópolis, , the bus fare in Belo Horizonte is only 40% higher, at 5.75 BRL (~0.93 EUR).

In terms of walking and cycling in Divinópolis, similarly to the majority of cities in Brazil, there is limited provision for active transportation. The municipality provides minimal infrastructure for pedestrians, with damaged sidewalks and a lack of accessibility ramps being widespread. Pedestrian areas are scarce, and the city's topography, with elevations ranging from 660 to 741 meters and slopes between 0 and 15%, together with the lack of proper cycling infrastructure (fewer than 5 km of bike lanes), discourages cycling as a viable mode of transportation. The *Mobility Plan*, developed in 2019, proposed expanding cycling infrastructure primarily for recreational purposes, with plans to connect leisure areas located far from the city center and other high-density zones (Prefeitura de Divinópolis, 2025). A more favorable scenario is observed in Governador Valadares, located 428 km from Divinópolis, with a population of 266,000. The city boasts 35 km of cycling infrastructure, and cycling is more widely adopted

as a mode of transport (Prefeitura de Governador de Valadares, 2025).

Promoting active transportation and reducing reliance on fossil-fuel-powered vehicles can significantly contribute to climate change mitigation while simultaneously improving public health (Brand et al., 2021). Expanding and modernizing public transport and cycling infrastructure in Divinópolis is a critical step toward reducing urban emissions and promoting more sustainable patterns of urban development, aligned with national and international goals such as Brazil's climate targets and the UN Sustainable Development Goals (SDGs).

Moreover, reliable mobility is key to economic growth, especially in a city like Divinópolis with strong commercial and industrial sectors, where traffic congestion, long travel times and limited connectivity could reduce labor productivity, increase logistics costs and limit business opportunities.

When considering the intricate relationship between public transport and urban development, it is clear that urban planning must incorporate transportation into broader urban strategies to ensure seamless integration of transport modes, thereby enhancing the quality of life for residents (Zhu et al., 2021). The urbanization process in Brazilian mid-sized cities, including Divinópolis, has seen significant spatial expansion over the last few decades. However, this growth has frequently occurred without corresponding enhancements in public transportation infrastructure, reflecting wider issues of urban planning, governance and social inclusion, while reinforcing car dependency, creating mobility challenges for residents in peripheral areas and leading to environmental degradation.

2.2. Compiling the questionnaire and conducting the survey

To determine people's perceptions of urban mobility in Divinópolis, we compiled a questionnaire with 18 questions, which was pre-tested on a sample group of ten respondents (4.5% of the total respond-ents), and the questionnaire's design, structure and wording were enhanced based on their feedback, to improve clarity and optimize the length before the final version could be shared (see Appendix). The questions covered a wide range of areas related to urban mobility, such as overall satisfaction with urban mobility and satisfaction with different transportation modes, people's willingness to choose transportation modes other than driving, perceptions of safety, smart solutions in urban transportation, and people's participation in the development of the urban mobility plan. Then we created the questionnaire using Google Forms. This allowed us to distribute the questionnaire effectively and ensure anonymity.

The questionnaire survey among the residents of Divinópolis was conducted using snowball sampling between 31st March 2024 and 29th May 2024. We distributed the questionnaire through social media platforms.

As a result, we collected 222 fully complete questionnaires, which were analyzed using Microsoft Excel. Of the respondents, 157 (70.7%) were women and 64 (28.5%) were men, while one respondent indicated the "other" category. We classified the respondents into five categories based on their age. As Table 1 shows, most respondents can be characterized as young and middle-aged adults (58.1%).

In terms of educational qualifications, 71 respondents (32.0%) have a master's degree and 67 (30.2%) have a bachelor's degree, 21 respondents (9.5%) have completed technical or vocational training, and 63 respondents (28.4%) have a high school education or are still studying.

Regarding employment status, 124 respondents (55.9%) reported that they were employed and 47 (21.2%) were self-employed. This means that 77.1% of those surveyed worked regularly. On the other hand, 12 (5.4%) respondents were unemployed, 12 (5.4%) were retired, 13 were students (5.9%), and 14 respondents chose not to answer the question (6.3%).

We also asked respondents to indicate their monthly household income. According to the Brazilian Institute of Geography and Statistics (IBGE), the per capita household income for Brazil was R$ 1,893 in 2023 (IBGE, 2024). As shown in Table 2, three fourths of respondents' household incomes exceed the national average.

Table 1. Demographic characteristics of respondents

Age category	18–24	25–34	35–44	45–54	55–64	65 or above
Number of respondents	27	75	54	43	17	6
Share of respondents	12.2%	33.8%	24.3%	19.4%	7.7%	2.7%

Source: authors' own elaboration

Table 2. Household incomes of respondents

Household income category	R$ 4,000 or more	R$ 3,001–4,000	R$ 2,001–3,000	R$ 1,001–2,000	R$ 501–1,000	R$ 251–500
Number of respondents	81	47	39	41	13	1
Share of respondents	36.5%	21.2%	17.6%	18.5%	5.9%	0.5%

Source: authors' own elaboration

3. Results

First, we wanted to know how much time people spend traveling each day. The results show that 66.7% of respondents (148 people) travel less than 30 minutes per day on average (Table 3). For 14.4% and 7.7% of respondents (32 and 17 people), daily travel in the city is between 30 minutes and 1 hour and 1 hour and 2 hours, respectively. Only 2.3% of respondents reported having to travel more than 2 hours per day. Interestingly, 85.4% of people who commute to work or school by car spend less than 30 minutes traveling in the city, suggesting that they have to cover shorter distances by car. This result is important because shorter distances could effectively be covered by other modes of transportation, such as cycling or walking.

Following this, we interviewed people about their satisfaction with urban mobility in Divinópolis. As Figure 2 shows, most respondents have negative perceptions of urban mobility in Divinópolis, with 54.1% (120 people) saying they are unsatisfied or partially unsatisfied with urban mobility. In contrast, less than a third (67 people) of the respondents are satisfied or partially satisfied with urban mobility; moreover, only 3.2% (7 people) indicated absolute satisfaction. In addition, women reported higher dissatisfaction rates than men (58.0% vs. 43.8%).

Further examining people's satisfaction with different modes of transportation, we asked respondents about their opinion on the efficiency of public transportation and the quality of walkability and cycling infrastructure. The results show that people have a fairly positive view of public transportation (56.8% – 126 people consider it efficient or rather efficient), while less than a quarter (49 people) consider it inefficient. In contrast, walkability and particularly cycling infrastructure received harsher ratings. For example, 12.2% of respondents reported that the city has good walkability, while for cycling infrastructure this figure is only 2.3%. Furthermore, only one person indicated that the quality of walkability was very good. Of respondents, 39.6% and 10.8% considered the city's walkability and cycling infrastructure to be moderate. Figure 3 shows that most people are very dissatisfied with walkability and cycling infrastructure: 48.2% of respondents rated walkability as bad or very bad (70 and 37 people), while a staggering 86.9% of respondents reported bad or very bad cycling infrastructure (85 and 108 people).

Based on perceptions of walkability and cycling infrastructure, we assumed that people do not prefer active modes of transportation during their daily journeys in the city. Therefore, we asked them what factors currently discourage them from using active modes of transportation. Our inquiry

Table 3. Share of respondents by transportation mode and travel time

Transportation mode most commonly used by respondent to commute to school/work	Number of respondents	Time spent commuting per day			
		less than 30 minutes	30 minutes to 1 hour	1 hour to 2 hours	more than 2 hours
Walking	24 (10.81%)	21 (9.46%)	3 (1.35%)	-	-
Cars	96 (43.24%)	82 (36.94%)	10 (4.50%)	3 (1.35%)	1 (0.45%)
Motorbikes	32 (14.41%)	31 (13.96%)	-	-	1 (0.45%)
Cars (Uber)	3 (1.35%)	1 (0.45%)	1 (0.45%)	1 (0.45%)	-
Bike	1 (0.45%)	1 (0.45%)	-	-	-
Public Transportation (Bus)	46 (20.72%)	12 (5.41%)	18 (8.11%)	13 (5.86%)	3 (1.35%)
None*	20 (9.01%)	-	-	-	-
Total	**222 (100%)**	**148 (66.67%)**	**32 (14.41%)**	**17 (7.66%)**	**5 (2.25%)**

*Respondent does not study/work, or work from home

Source: authors' own elaboration

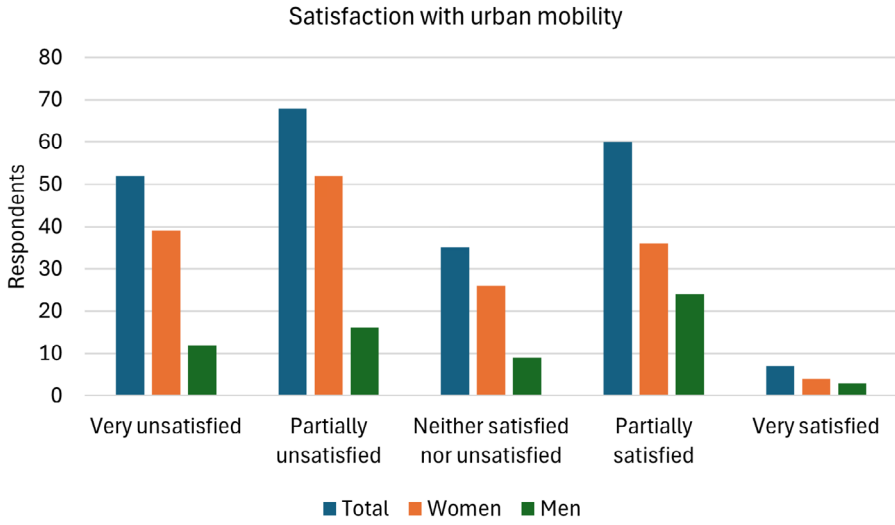

Fig. 2. Respondents' satisfaction with urban mobility in Divinópolis
Source: authors' own elaboration

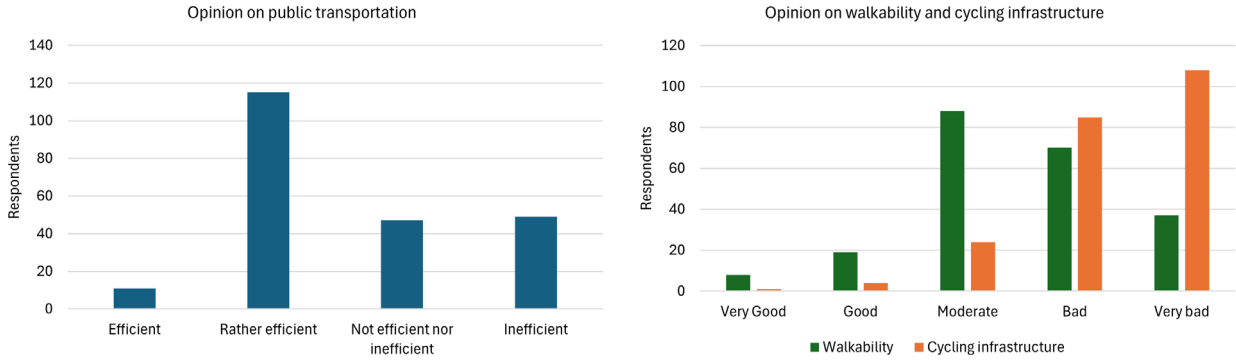

Fig. 3. Respondents' opinion on the efficiency of public transportation and the quality of walkability and cycling infrastructure
Source: authors' own elaboration

also covered discouraging factors related to the use of public transportation. The two most important factors discouraging people from using public transportation in Divinópolis are crowded buses and the lack of punctuality of the service (Table 4). In the case of active modes of transportation, the lack and poor quality of infrastructure was the most important discouraging factor. In addition, people also expressed dissatisfaction with safety. Long distances and weather conditions were also considered negative, moreover, ten respondents indicated that the public prestige of walking and cycling is not high compared to driving. Finally, it should be noted that 92 respondents consider it problematic that all modes of transportation other than driving require additional time to make journeys.

When we asked respondents what factors make public transportation and active modes of transportation more attractive to them, unsurprisingly, people indicated the opposite of the discouraging factors. For example, 115 respondents indicated public safety should be increased (e.g., by improving the CCTV network and having more police patrols on the streets). Improving safety for cyclists (101 people) and pedestrians (84 people) were also important factors for respondents (e.g., safe bike lanes and sidewalks). Almost a third of respondents (66 people) wanted public transportation to be improved (e.g., more bus services and improved service punctuality). Moreover, 72 people want to spend less time on public transportation and active modes of transportation. In addition, other factors were mentioned that could encourage people to reduce car use. The

health benefits of walking and cycling were seen as an important factor making these modes of transportation attractive (89 people). Environmental concerns also seem to be an important factor for many (83) people when considering the disadvantages of using a private car. Finally, 50 respondents indicated that they would choose transportation modes other than driving if the costs of using a passenger car (e.g., gasoline prices) increased significantly.

Since safety seems to be a key factor in making public transportation and active modes of transportation more attractive, we asked people some additional questions about it. We considered this issue to be of utmost importance because, if people do not feel safe when traveling by bus or walking/cycling on the street, they will choose the car to travel in the city. Figure 4 shows that most respondents consider perceived safety to be a crucial factor influencing their willingness to use public transportation or to walk and cycle in the city. Only 12.6% of respondents indicated that safety does not influence their decision regarding their preferred mode of transportation.

We then asked people to report on what measures they thought would make public transportation and urban environments safer. Most respondents (171 people) said that more police officers should patrol the streets. Many respondents (157 people) lack adequate public lighting on the streets. In addition,

Table 4. The most important factors discouraging people from using public transportation and walking and cycling

Factors discouraging public transportation use	Number of respondents	Factors discouraging walking and cycling	Number of respondents
Crowded buses	104	Inadequate infrastructure for active transportation	118
More time spent*	92	Damaged and uneven sidewalks	77
Buses are often delayed	67	Lack of safety for pedestrians and cyclists	74
Lack of buses	3	Long distances	67
Buses' conditions (dirty, noisy, hot)	1	Weather conditions (too hot and rainy days)	48
Difficulties travelling by bus with kids	1	Impact on social status (walking and cycling are somewhat looked down upon compared to driving)	10

*Considering all transportation modes other than driving
Source: authors' own elaboration

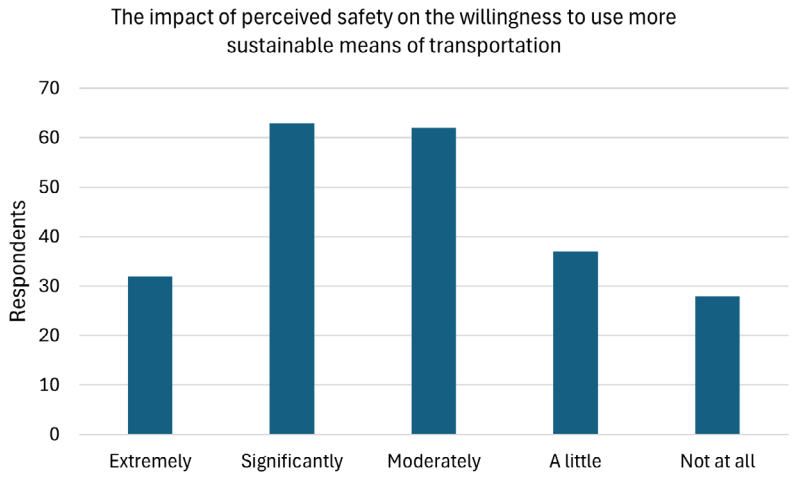

Fig. 4. The most important factors discouraging people from using public transportation
*Considering all transportation modes other than driving
Source: authors' own elaboration

144 and 98 people would like to have surveillance cameras on buses and on the streets, respectively.

In the next phase, we asked people about smart mobility and the smart solutions they use or would like to use in transportation. First, we asked people whether Divinópolis should adopt more smart solutions to improve urban mobility or focus on improving the existing transportation system in a traditional way. To this question, 80.6% of respondents (179 people) indicated that they would like to use more smart solutions, while only 19.7% of respondents said that traditional developments (e.g., new buses and improved functionality) would be sufficient for an efficient transportation system.

Regarding smart solutions already used by people, 143 respondents reported being regular users of ridesharing and ridehailing services via mobile applications (e.g., Uber, 37 City, and 99). In addition, 109 people use web mapping platforms for route planning (e.g., Google Maps and FaleBus). Smart parking systems are used by 67 respondents. At the same time, 36 reported that they do not use smart solutions in urban mobility at all.

However, there are several smart solutions that people would like to use if they were available. For example, most respondents (157 people) suggested installing real-time passenger information displays at bus stops. Another 114 respondents indicated that public transportation operators should use electric and hybrid vehicles. One hundred people would like to use bike-sharing across the city, and 72 would prefer to use electric scooters for city trips. A popular smart solution (indicated by 93 respondents) is the VLT (*Veículo leve sobre trilhos*), a light rail system used specifically in Rio de Janeiro.

When asked whether Divinópolis should adopt transportation solutions that are more environmentally sustainable, 91.9% of respondents (204 people) said they completely agreed with this statement. We then asked people to make suggestions for urban issues they felt were important for the municipality to address and improve. Table 5 shows that people want better access to good quality basic urban services such as public healthcare, education and transportation. They also consider it a priority for the municipality to increase security levels and reduce the crime rate. Only 5.4% of respondents think that urban sprawl is a problem that needs to be addressed.

Finally, we asked people about their participation in the development of the municipality's mobility plan. We were curious to know whether residents were aware of the development of the mobility plan and whether they had participated in public sessions related to the mobility plan. Surprisingly, 90.5% of respondents (201 people) had no information about the development of the urban mobility plan. Only 6.8% of respondents (15 people) indicated that they knew that the municipality was developing such a plan. So, we asked this latter group whether they had participated in public sessions about the development of the urban mobility plan. Three out of the 15 respondents stated that they had participated in the sessions, meaning that only 1.4% of respondents were actively involved in the planning process. Our final question was whether people would be willing to participate in the planning process if they had information about it. In response to the question, 95 people (42.8%) indicated that they would participate in the planning process, and another 83 (37.4%) said that they would probably participate. Only 29 people (13.1%) declined to participate in the planning process.

Table 5. The most significant urban problems according to respondents

Urban problems	Number of respondents
Access to good quality public healthcare	143
Urban mobility	129
Access to good quality education	119
Reducing crime levels	89
Sustainability and the expansion and protection of urban green spaces	67
Reducing poverty and homelessness	55
Access to drinking water and improved sewage system	52
Urban sprawl	12

Source: authors' own elaboration

4. Discussion and conclusions

Cities in developing countries are experiencing rapid population growth (United Nations, 2024) and massive urban sprawl (Zhang, 2008; Abu Hatab et al., 2019). Metropolises with millions of inhabitants are often unable to provide urban services in sufficient quantity and quality (United Nations, 2020). In many cities in developing countries, urban transportation serves as a notable example of inadequate urban services (see, for example Hidalgo, 2009; Katz & Rahman, 2010; Salon & Aligula, 2012; Paget-Seekins et al., 2015; Kenworthy, 2017) and is regularly seen as a bottleneck for improving the quality of urban life. However, due to the rapid increase in the number of cars and the underdevelopment of transportation infrastructure and services, urban transportation has become a serious problem even in medium-sized cities. Recognizing this issue, the Brazilian government introduced the Urban Mobility Law in 2012, ordering municipalities with more than 20,000 inhabitants to prepare a comprehensive urban mobility plan (Bezerra et al., 2020). The National Urban Mobility Policy sets out several key principles that urban transportation must comply with. These principles cover areas such as universal accessibility, equal access to public transportation, efficiency of urban transportation services, sustainable development of cities, safety during travel, democratic governance, and public participation in planning. Because more than a decade has passed since then and many municipalities, including medium-sized cities, have developed urban mobility plans, it was reasonable to examine how people see urban mobility.

The case of Divinópolis shows that people consider urban mobility to be one of the most important urban services, but express general dissatisfaction with urban mobility. While satisfaction with public transportation is not so harsh (see another case discussed by Santos & Lima, 2021), dissatisfaction with the city's walkability and cycling infrastructure is strong. It is important to note that the average income of respondents appears to be slightly higher than the national average, and, generally, higher-income individuals might experience better access to transport options and thus report higher satisfaction levels with existing systems. In contrast, lower-income respondents may feel constrained by their limited mobility options (Leandro-Reguillo & Stuart, 2021). In addition, of the 126 respondents who considered the public transportation in Divinópolis to be efficient or rather efficient, only 25 (19.8%) have public transport as their main daily transport mode. The remaining 101 respondents use private cars and motorbikes for commuting.

In general, the lack of infrastructure (e.g., bike lanes) and the poor quality of what exists (e.g., crowded buses and poor-quality sidewalks) have proven to be the most crucial factors preventing people from using public transportation, walking and cycling (see also Humberto et al., 2019; Câmara, 2021; Lima et al., 2024; Magalhães et al., 2021; Marino, 2024; Thaisi Garro Knebel et al., 2024). Purchasing new buses would require a significant amount of money for the public transportation operator, and building bike paths and new sidewalks and renovating existing ones would be costly for the municipality. However, when the urban transportation infrastructure comes under pressure due to increased car use, municipalities tend to place greater emphasis on traditional infrastructural developments such as increasing the road network. This could reduce the amount of money available to develop more sustainable modes of transportation and further exacerbate existing transportation problems.

The quality of public transportation and pedestrian and cycling infrastructure is obviously the primary consideration for people choosing such a mode of transportation. Moreover, the time spent traveling is also very important. From this point of view, our results are somewhat surprising. In Divinópolis, most people (two thirds of respondents) spend less than 30 minutes commuting daily, and only one in ten people need to travel more than an hour within the city. Nevertheless, respondents expressed concerns about wasting time while using public transportation or walking and cycling. In fact, the situation is more dramatic in metropolises such as São Paulo, Rio de Janeiro and Curitiba (de Sá et al., 2015; Siacon, 2018; Boisjoly et al., 2020; Liao et al., 2020), where the majority of people spend hours commuting. This suggests that perceived problems of urban mobility in medium-sized cities need to be put into context. Moreover, since urban travel takes less than half an hour for most people (and therefore likely covers shorter distances), walking and cycling can be effective alternative modes of transportation. This suggests that it is justified to expand pedestrian and cycling infrastructure and, at the same time, improve the quality of the existing infrastructure.

In addition to the above problems, lack of safety seems one of the biggest obstacles to people choosing public transportation, walking and cycling. Safety issues need to be discussed from two perspectives: 1) violence and crime experienced while using public transportation and 2) people's perceived insecurity while walking and cycling. Regarding the first topic, several studies report that violence and crime associated with public transportation have reached alarming levels in Brazil (Paes-Machado & Leven-

stein, 2004; Cardoso et al., 2021; Moreira & Ceccato, 2021). Additionally, women are often subjected to sexual assault and harassment at public transportation stations and vehicles (Ceccato & Paz, 2017; Freitas et al., 2023). Since increasing violence and crime in Brazil represent significant social problems (Murray et al., 2013; Moreira & Ceccato, 2021), it is difficult to solve these problems locally. However, there are notable measures to create a safer environment and travel conditions for women using public transportation. In Rio de Janeiro, for example, separate areas for women have been created in the metro (also known as "pink carriages"). Although the effectiveness of the measure is debatable (Curzi, 2017) and the original problem has not been eliminated (Dunckel-Graglia, 2013), it certainly represents progress towards reducing violence against a certain vulnerable group. In particular, women might prioritize safety, accessibility and scheduling, especially when navigating travel for family-related activities (Ng & Acker, 2018), which indicates that gender-responsive policies could be necessary to meet the needs of different demographics adequately.

Regarding the second topic, numerous studies prove that accidents involving cyclists occur primarily due to the lack of adequate infrastructure to prevent cyclists from being injured in traffic (Freitas & Maciel, 2017; Bacchieri et al., 2010). Another study shows that pedestrians crashes correlate with the absence of a sidewalk along a roadway segment (Larranaga et al., 2019; Abou-Senna et al., 2022). Therefore, this study reiterates the call for improvements to pedestrian and bicycle infrastructure to make active modes of transportation safer. In addition, educating and sensitizing drivers and imposing deterrent penalties for traffic violations (see for example Elvik & Christensen, 2007) would also be important, as driver aggressiveness and drunk-driving have proven to be serious problems in urban transportation in Brazil (Olandoski et al., 2019; Scherer et al., 2020).

The results also show that people are open to the application of smart solutions in urban mobility, care about the environment and consider sustainability to be an important concept. While it was anticipated that younger individuals would be more inclined toward innovative and sustainable transport options – given their tendency to use multimodal transportation such as biking, walking and public transportation (Wells et al., 2021), no clear age-related pattern emerged. Over 90% of participants (204 individuals) across all age groups agreed that Divinópolis should adopt more environmentally sustainable transport solutions. Similarly, among the 67 individuals (30% of respondents) who prioritized sustainability and green space protection, no specific age group was predominant. People's positive mindset is definitely a good starting point for future transportation developments. For example, a study shows that autonomous electric buses have the potential to be used for public transportation in Brazilian cities (Ganga et al., 2025). Nevertheless, public opinion is quite harsh on the quality of traditional transportation infrastructure and services, as well as urban services in general (i.e., healthcare, education and security). This may raise questions such as whether it is justified to install real-time passenger information displays at bus stops if the service is provided with unreliable punctuality. Another example of this contradiction is that people would like to use bike-sharing services in the city, while the cycling infrastructure does not support regular cycling. Additionally, as demonstrated by Fortes et al. (2024), wealthier communities accommodate a significant share of cycling infrastructure developments, while the demands of peripheral areas, particularly those with a high concentration of black people, are often overlooked by municipalities. This suggests that priorities need to be carefully set in urban development and urban mobility plans.

In addition, it is essential to involve citizens in urban mobility planning (Lindenau & Böhler-Baedeker, 2014), which is apparently not working effectively in Divinópolis. If the main goal of urban/mobility planning is to comply with higher-level regulations (see for example Chengzhi et al., 2023) and the individual visions of local decision-makers, the result can easily be a failure and will not meet the actual demands of residents. Of course, it is not only city officials and planners who need to effectively promote the planning process (Khisty, 2000), but people also need to be motivated to participate in the planning process. Our results show that people would be willing to discuss mobility plans with planners if they had the opportunity. This highlights the responsibility of local government to enable people to participate in decision-making.

Finally, we must add some limitations of the study. The number of people reached with the questionnaire did not allow for cross-tabulations, so we were unable to examine how people perceive urban mobility based on socio-economic and demographic characteristics. In addition, because the survey was conducted remotely, we were unable to assemble a group of respondents whose composition would ensure the representativeness of the survey. Consequently, there appears to be a slight gender bias in the composition of respondents, which may influence the results on certain topics, such as safety and urban issues. Furthermore, the average income

of the respondents appears to be slightly higher than the national average, which may also lead to some bias. Unfortunately, the amount of data did not allow us to analyze the results by income group; however, studies show that income differences can influence the choice of transportation modes (see for example Thuany et al., 2020; Araujo et al., 2025). Overall, we believe that the main findings of the study on urban mobility in Divinópolis are not significantly influenced by the above limitations of the survey.

Medium-sized cities in Brazil are experiencing an increase in urban mobility problems, mainly due to the dominance of car-based transportation. The central government has introduced the *National Urban Mobility Policy* to promote the adoption of sustainable transportation modes in cities in the country. Therefore, municipalities with over 20,000 inhabitants had to prepare an urban mobility plan that was aligned with national policy. Divinópolis, a city with a population of around 240,000 inhabitants, also prepared its urban mobility plan in 2019. Our study showed that public involvement in the preparation of the plan was not effective. However, most people are dissatisfied with urban transportation in the city, primarily criticizing the quality and reliability of public transportation, as well as the inadequate pedestrian and cycling infrastructure. Another major problem highlighted by people is the lack of safety. These problems prevent people from using public transportation and active modes of transportation, encouraging them to drive instead. In addition, people are open to using smart solutions in transportation, but the infrastructural prerequisites for their application are lacking. Therefore, this study encourages the involvement of people from all socio-economic and demographic groups in local decision-making regarding urban mobility planning in order to ensure that the outcome of urban transportation developments better meets people's needs.

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Appendix

Questionnaire

- How much time do you usually spend traveling on a daily basis?
- How satisfied are you in general with urban mobility in Divinópolis?
- What is your opinion about walkability in Divinópolis?
- What is your opinion about public transportation in Divinópolis?
- What is your opinion about the cycling infrastructure in Divinópolis?
- What factors currently discourage you from using active modes of transportation?
- What would make you choose more active modes of transportation (e.g., walking and cycling) instead of driving?
- To what extent do violence and safety levels influence your willingness to use more sustainable means of transportation (e.g., public transportation, walking and cycling) instead of driving?
- Which measures would make you feel safer and which measures would motivate you to use more active modes of transportation?
- Should Divinópolis adopt smart solutions to improve urban mobility?
- What smart solutions do you use that are already available in the city?
- What other types of smart mobility solutions do you think Divinópolis should implement?
- To what extent do you agree with the following statement? "Divinópolis needs transportation solutions that are more environmentally sustainable."
- In your opinion, which areas in Divinópolis should the local government prioritize?
- The Mobility Plan for Divinópolis was approved in 2019, after 4 years of discussions and 3 public sessions (the first held in December 2018, the second in March 2019 and the last in April 2019). Did you know when the mobility plan was under discussion?
- If so, did you participate in the survey or attend the public sessions?
- If not, would you participate if you were aware of it?