RA'EGA
O ESPAÇO GEOGRÁFICO EM ANÁLISE
https://revistas.ufpr.br/raega

ISSN eletrônico 2177-2738
RA'EGA, Curitiba, PR, V.65, n.1, p. 90 – 116, 4/2026
http://dx.doi.org/10.5380/raega.v65i1.103168

Between sidewalks and destinations: analyzing walkability on Campina Grande's main avenue

Entre calçadas e destinos: analisando a caminhabilidade na principal avenida de Campina Grande

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http://dx.doi.org/10.5380/raega.v65i1.103168

Abstract

This research evaluated walkability conditions on the central stretch of Avenida Floriano Peixoto, the main avenue in the city of Campina Grande, from the pedestrian's perspective. In-person and online survey questionnaires were administered to 405 pedestrians. The study identified the dimensions of urban function and comfort as the most critical points. Parking, the presence of weather protection elements, dimensions, connectivity, and route attributes received positive evaluations, primarily due to accessibility to support points and the presence of pedestrians in the morning and afternoon. Overall, some variables were positive while others require attention from public authorities.

Keywords:
Floriano Peixoto Avenue, Urban Management, Urban Mobility, Pedestrians.

Resumo

Esta pesquisa avaliou as condições de caminhabilidade no trecho central da Avenida Floriano Peixoto, principal avenida da cidade de Campina Grande, sob a perspectiva do pedestre. Para isso, foram aplicados questionários presenciais e virtuais do tipo *survey,* com 405 pedestres. Os resultados identificaram que as dimensões: função urbana e conforto foram os aspectos que mais apresentaram pontos críticos. Os estacionamentos, a presença de elementos de proteção contra intempéries, as dimensões, conectividade e atributos da rota obtiveram avaliações positivas, especialmente em decorrência da acessibilidade a pontos de apoio e a presença de pedestres nos períodos matutino e vespertino, revelando que as condições de caminhada na avenida são neutras, na medida em que algumas variáveis são avaliadas positivamente, e outras precisam de atenção do poder público.

Palavras-Chave:
Avenida Floriano Peixoto, Gestão Urbana, Mobilidade Urbana, Pedestres.

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I. INTRODUCTION

Walking is the basic means of human transportation, because everyone is a pedestrian and sometimes uses other means of transportation. Consequently, urban mobility policy must pay attention to all means of movement, especially the conditions of walking offered to the population.

Jacobs (2011) explains that when he investigated the reason for the city's existence, its fundamental function was to meet people's needs. Sidewalks are the spaces of the city's people. These are not just concrete strips built on the streets, but they are a place where city residents can meet and move between streets.

However, the small investment to improve the mobility conditions of people has caused the reversal of priorities in the structure of urban mobility policies, resulting in an increase in the number of cars, and a decrease in the number of people walking in the city (ANTP, 2020). This change became a reality, even though experts, especially doctors, highlighted the benefits of walking for physical and mental health (Orbolato, 2024).

In order to understand the benefits of walking, urban mobility professionals such as architects, urban planners and traffic engineers are examining ways to encourage people to use walking as their main mode of transportation rather than cars and motorcycles. To this end, a model of walking distances has been proposed in various parts of the world, such as Canada, Brazil, Colombia and Iran, to assess the level of walking distances in cities and to help identify the main points to be restored on urban roads (Gonzalez-Urango et al., 2020; Ahmed, 2021; Boongaling, 2021; Nabipour; Rosenberg; Nasseri, 2022).

To organize these studies, Lopes and Vasconcelos (2025) compiled a literature review presenting pedestrian-oriented walking models and separating them according to the types of urban spaces in which they were applied. The authors decided to study models incorporating pedestrian analysis because they were more inclusive of those who actually benefit from the aspects of urban walking (Alfonzo, 2005; Gonzalez-Urango et al., 2020; Li et al., 2021; Saadi et al., 2021; Siqueira, 2021; Arellana et al., 2022; Fonseca et al., 2022; Liao et al. 2022).

Among the models developed in the central neighbourhoods, pedestrians tend to prioritize safety, comfort, accessibility, connectivity, attractiveness and mixed land use (Lopes; Vasconcelos, 2025). It should be noted that the neighbourhoods in the city center are the city spaces that show the largest number of dimensions considered relevant by pedestrians in response to the diversity of activities and profiles belonging to this segment.

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RA'EGA, Curitiba, PR, V.65, n.1, p. 90 – 116, 4/2026
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One study was the walking model proposed by Gonzalez-Urango et al. (2020) is outstanding, providing a set of dimensions and variables that can analyze the walking conditions of urban centers based on the perception of people who should actually participate in urban decisions: pedestrians.

The model was proposed in Colombian City of Cartagena de Indias, based on literature reviews, with the cooperation of various stakeholders, such as public authorities, merchants, pedestrians, and traffic officials. Thus, the factors most encouraging for the inhabitants of the city are not only the quality of the walk but also the cultural attraction, as it is a tourist-oriented city.

Walkability research is part of an interdisciplinary epistemological field, including urbanism, geography, and public health (Jacobs, 2011). This approach begins with the concept of the city as a complex system, in which environmental factors shape the experience of pedestrians. Therefore, the analysis carried out in this study is conducted from the perspective of combining elements of sustainable urban management and evidence-based urban studies to understand the pedestrian mobility as a result of the relationship between mobility conditions and user perception.

Despite progress in pedestrian studies, there is a lack of studies focusing on cities in the northeast of Brazil, particularly when considering the views of pedestrians as the central axis of analysis. This difference limits the formulation of public policies and urban interventions adapted to local realities.

The main objective of this study was therefore to evaluate the pedestrian accessibility of the central section of Floriano Peixoto Avenue, the main road of the Grande-PB Campina, from a pedestrian point of view.

In this study, the walkability model proposed by Gonzalez-Urango et al. (2020) was adopted, built on the basis of pedestrian perception, applied to the central area of Campina Grande-PB, with a similar characteristic to the central part of Floriano Peixoto Avenue.

II. METHODOLOGICAL DESIGN

Research Characterization

According to Guerra (2023), research can be classified according to its purpose and means. With respect to its purpose, this research is classified as exploratory and descriptive. In terms of means, it is field research. In data processing, the methodology of mixed methods, using quantitative and qualitative techniques, has been chosen, as long as the latter justifies the first method.

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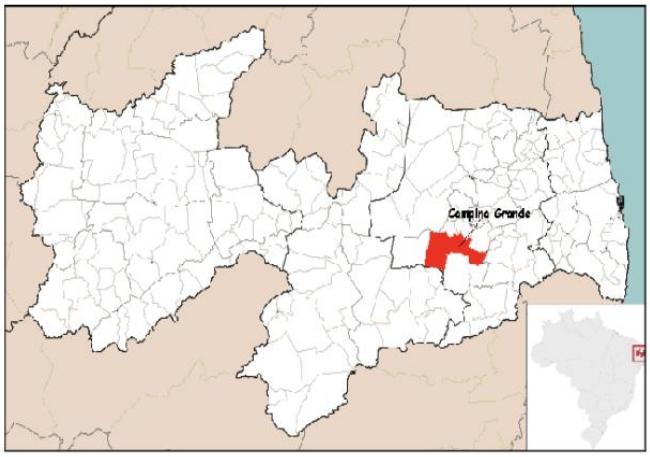
Area of Study

Campina Grande is located in Paraba, in the northeast of Brazil, covering an area of 66.6104 km2. The city has a population of about 419,379 and is a medium-sized city. Campina Grande is located above sea level and has a tropical climate. In addition, it is a city with a high potential for tourism, especially in June, when the traditional June festival is celebrated. The city is known nationally for hosting the largest So Joo festival in the world each year, a name given to the 30 days of the June festival. Campina Grande is considered to be an industrial center in the northeast, as well as a reference university center.

For this research, the section of Avenida Floriano Peixoto from the Severino Cabral Municipal Theatre to the viaduct was selected. It is the main street that crosses the city from east to west along a long straight line, and is the place where the city's most important historical and cultural monuments are located, such as the Cathedral, the Campina Grande historical and geographical museum, and Cine Capitólio Cinema.

Figures 1 and 2 below show the location of Campina Grande in Paraíba and Floriano Peixoto Avenue on the city map, respectively.



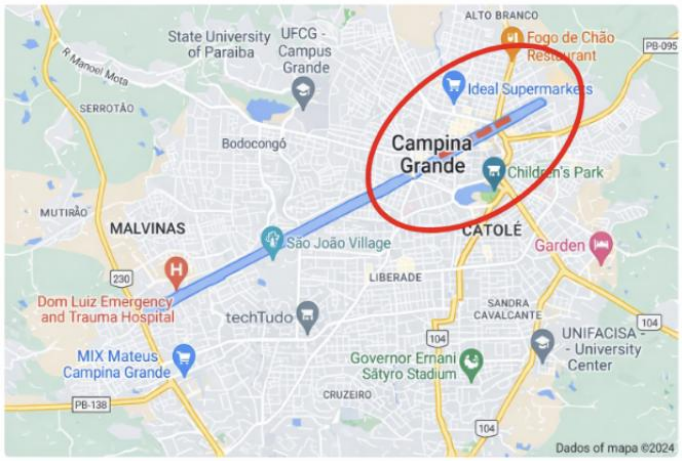


Figure 1 – Campina Grande – PB. Figura 2 - Floriano Peixoto Avenue. Source: Google Maps (2024)

The road indicated in red in Figure 2 represents the section of the street that runs from the municipal theatre to the viaduct where the research was conducted. This section of the street is located in the central district and has a high population because it is the economic center of Campina Grande.

Data Collection

The instrument adopted for data collection was a structured questionnaire, based on the script proposed by Gonzalez-Urango et al. (2020). The questionnaire presented 7 questions regarding the respondent's profile

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and 23 statements about how the respondent perceives the walkability factors on the avenue. The statements relate to the variables included in each dimension of the model proposed by Gonzalez-Urango et al. (2020), as shown in Table 2.

Table 2 – Walkability Model Proposed by Gonzalez-Urango et al. (2020)

Dimensions	Definition	Variables	Definition
Connectivity	This refers to the connection between areas with key "attractors," such as public transport stops, schools, work, and leisure destinations. Routes should form a comprehensive network.	Public transportation	Access to public transportation (e.g., buses, taxis)
		Access to commerce	Access to commerce
		Access to workplaces	Access to workplaces
		Access to educational centers	Access to educational centers (e.g., schools and universities)
		Intersections to reach the destination	Availability of intersections to facilitate arrival at a destination (e.g., alternative routes)
		Connectivity of sidewalks	Absence of interruptions or physical elements that would require changing a route
		Distance	Related to the distance to be traveled between one point and another
Urban function	This refers to the different uses that inhabitants develop in the territory. Determining the purpose or function of a space and, therefore, the usability of a territory.	Number of parking spaces	Presence of parking areas
		Location of parking spaces	Proximity to parking areas
		Presence of cultural elements	Presence of environments and activities that promote culture
		Attractiveness of cultural elements	Level of attractiveness of the avenue's cultural elements
Route attributes	Elements in routes and their context related to urban design and performance.	Presence of meeting points	Presence of spaces where people can gather (e.g., squares and churches)
		Attractiveness of meeting points	Level of attractiveness of the avenue's meeting points
		Space for street vendors	Adequate and safe space for street vendors who promote vitality to the streets
		Presence of pedestrians during the day	Pedestrian density in the morning and afternoon shifts
		Presence of pedestrians at night	Pedestrian density at night
		Traffic on the street	Vehicle traffic conditions

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Comfort	Elements that affect the performance, behavior, and perceptions of a path.	Cleanliness of the avenue	Perception of a pleasant and beautiful environment, through the maintenance of cleanliness
		Avenue lighting	Adequate lighting at all times
		Interesting urban architecture	Attractiveness from an architectural and urban planning point of view, transparency and permeability of public-private space
		Pleasure of walking on the avenue	Attributes that generate less stress or a pleasant feeling of being relaxed
		Presence of elements of protection against inclement weather	Urban structures capable of protecting pedestrians against climatic factors, such as rain and sun
		Sense of security	To assess one's state of being and feeling safe from harm or danger

Source: Gonzalez-Urango et al. (2020)

For this purpose, a 5-point Likert scale was created, where 1 represented "strongly disagree," 2 represented "disagree," 3 represented "neither agree nor disagree," 4 represented "agree," and 5 represented "strongly agree." Finally, the questionnaire included a discursive question in which the respondent should indicate improvements to be made to the analyzed section, which was used to corroborate the quantitative data.

Data collection occurred in two ways, with simultaneous applications. The first involved a survey where a link was shared via Google Forms to access the research questionnaire with residents or visitors of the city of Campina Grande who use Avenida Floriano Peixoto. The link was active for receiving responses between November 13, 2023, and December 31, 2023. In addition to virtual data collection, questionnaires were administered directly at the research site, which allowed for the measurement of responses, as well as the observation and exchange of other information relevant to the walkability conditions of the avenue.

The sample size was defined based on the rule of ten participants per variable (10:1) for multivariate analyses (Everitt, 1975). As the study evaluated 23 variables, the minimum recommended number would be 230 respondents. In total, 405 questionnaires were answered, of which one was excluded for having marked the "no" option in the consent form and 16 for not having indicated that they were answering the questionnaire attentively, leaving 388 questionnaires for analysis. Thus, the final sample easily exceeds the minimum required by the literature, ensuring adequate statistical robustness for the proposed analyses.

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Data Processing

For data processing, the R software for Windows, version 4.3.2, was chosen. In this sense, a data dictionary was proposed, in which keywords were used to identify the variables. Based on the frequency of evaluation of the variables by pedestrians, statistical treatment was carried out, identifying measures of central tendency and dispersion.

Along with the assessment of quantitative data, content analysis was performed, following the recommendations of Bardin (2011), in which the author proposes that content analysis should follow 3 stages: material selection, categorization, and analysis. Thus, the responses from the questionnaires on which aspects the respondent believes the avenue needs to be improved were applied using the Atlas.ti software as support, followed by the structuring of categories among the comments according to the dimensions and variables pointed out by Gonzalez-Urango et al. (2020). From this, the analyses of the responses were carried out in accordance with the quantitative data. Thus, in this work, the categorization and analysis of the speeches was done based on the dimensions and variables of the walkability model by Gonzalez-Urango et al. (2020).

III. PRESENTATION AND ANALYSIS OF RESULTS

Respondent Profile

Table 1 presents the profile of pedestrians who frequent the selected section of Floriano Peixoto Avenue. Initially, people were asked to answer objective questions to create an aggregate profile of the respondents. Table 1 presents the responses from the 388 questionnaires.

Table 1 – Respondent Profile

Factors	Responses	Frequency	Cumulative frequency	Percentage
Mode of movement on the avenue	On foot	123	123	31.70%
	Bicycle	2	125	0.52%
	Car	133	258	34.28%
	Motorcycle	27	285	6.96%
	Bus	103	388	26.55%
	Physical activity	12	12	3.09%

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Motivation for traveling on the avenue	Shopping	91	103	23.45%
	Study	36	139	9.28%
	Churches/religious temples	21	160	5.41%
	Leisure	15	175	3.87%
	Other	4	179	1.03%
	Health services	23	202	5.93%
	Work	186	388	47.94%
Age group	Between 15 and 24	105	105	27.06%
	Between 25 and 34	87	192	22.42%
	Between 35 and 44	78	270	20.10%
	Between 45 and 54	54	324	13.92%
	Between 55 and 64	40	364	10.31%
	Between 65 and 74	24	388	6.19%
Gender	Male	149	149	38.40%
	Female	236	385	60.82%
	I prefer not to say	3	388	0.77%
Average monthly income	From 0 to 2 salaries	256	256	65.98%
	From 3 to 5	86	342	22.16%
	From 6 to 10	33	375	8.51%
	From 11 to 15	13	388	3.35%

Source: Research results (2024)

A total of 41% of people who travel along the avenue use individual motorized means of transport (cars and motorcycles), while the other 59% adopt sustainable means of transport (walking, bus, and bicycle). The data analysis shows that the stretch of the avenue is not dominated by automobiles; on the contrary, there is considerable demand for spaces that allow the circulation of public transport, cyclists, and pedestrians. Therefore, prioritizing spaces for the circulation of motorized vehicles does not reflect the needs of the majority of individuals who travel along this stretch, reinforcing the urgency of urban planning that is more balanced with the forms of transportation actually used.

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Regarding the motivation for going to/passing through the avenue, almost 48% of the sample does so because of work, since the commercial hub of the city is concentrated in the analyzed stretch, especially the retail stores that include clothing, footwear, household goods, pharmacies, and supermarkets. Furthermore, it is also where the municipal public library, the municipal theater, the commercial association, the Chamber of Retailers, the city cathedral, informal commerce, the central market, etc., are located. Additionally, 23.45% of people responded that they frequent the avenue for shopping, which is justified by the number of commercial establishments located along the route. Regarding these establishments, it should be noted that representatives of all of them were consulted in order to obtain the perception of the different urban actors. The high number of people who frequent the avenue not only as a transit space but also as an area for lingering shows the need for adequate infrastructure to meet the needs of users, such as places to sit, comfortable sidewalks, food areas, and a sense of security, especially when considering the age differences between groups on the avenue (Naharudim et al., 2020; Majundar et al., 2021; Siqueira, 2021).

The most representative age group was 15 to 24 years old (27.06%), suggesting that the dynamics of Floriano Peixoto Avenue are influenced by a young audience. Even so, the significant presence of adults and the elderly in other age groups reinforces that the avenue is a space used by people of different profiles, which demands urban solutions that meet everyone's needs. For example, young people are more likely to accept longer commutes, but they mention the attractiveness of the avenue as a focus of attention, as observed by Fonseca (2022), while the elderly, in turn, tend to be more sensitive to factors such as low lighting and uneven sidewalks (Moura; Cambra; Gonçalvez, 2017). Considering this divergence between age groups, it is essential that inclusive and universal solutions be applied along the avenue.

Regarding gender, it is noticeable that the majority of respondents were women, reflecting a direct relationship with the number of female inhabitants in the city (52.63%) (IBGE, 2022). Furthermore, it is common for women to use public transport more or walk more than men. In addition, domestic tasks, such as taking children to school, shopping, or going to the doctor, usually fall to women, increasing the frequency of daily commutes and, consequently, increasing their chances of being included in mobility research (Tiran; Lakner; Drobne, 2019; Goel et al., 2022). In this sense, the predominance of women reinforces the need to include a gender perspective in urban planning, especially when considering that women are more exposed to sidewalks in poor walking conditions, poor lighting, and insecurity on avenues (Alkheder et al., 2022). Therefore, the female perspective should be taken into account in urban studies as a way to avoid reinforcing inequalities.

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The data analysis shows that 66% of people said their average monthly income is between 0 and 2 minimum wages, which, to some extent, converges with the fact that people use the least expensive means of transportation, in addition to using the avenue for work purposes, considering that most Brazilian workers receive at most the equivalent of two minimum monthly wages (IBGE, 2022). From this perspective, the quality of infrastructure on the avenue manifests itself as a condition of equity, given that people with low incomes are more dependent on public transportation and other public spaces, making the proposed interventions not only a matter of mobility but also of social justice, guaranteeing the right to the city for all (Nabipour; Rosemberg; Nasseri, 2022).

Walkability Analysis

Figure 3 shows the percentage of people who assigned positive, neutral, and negative opinions to each walkability variable analyzed. The graph is organized so that the variables that obtained the most "strongly agree" responses are in descending order.

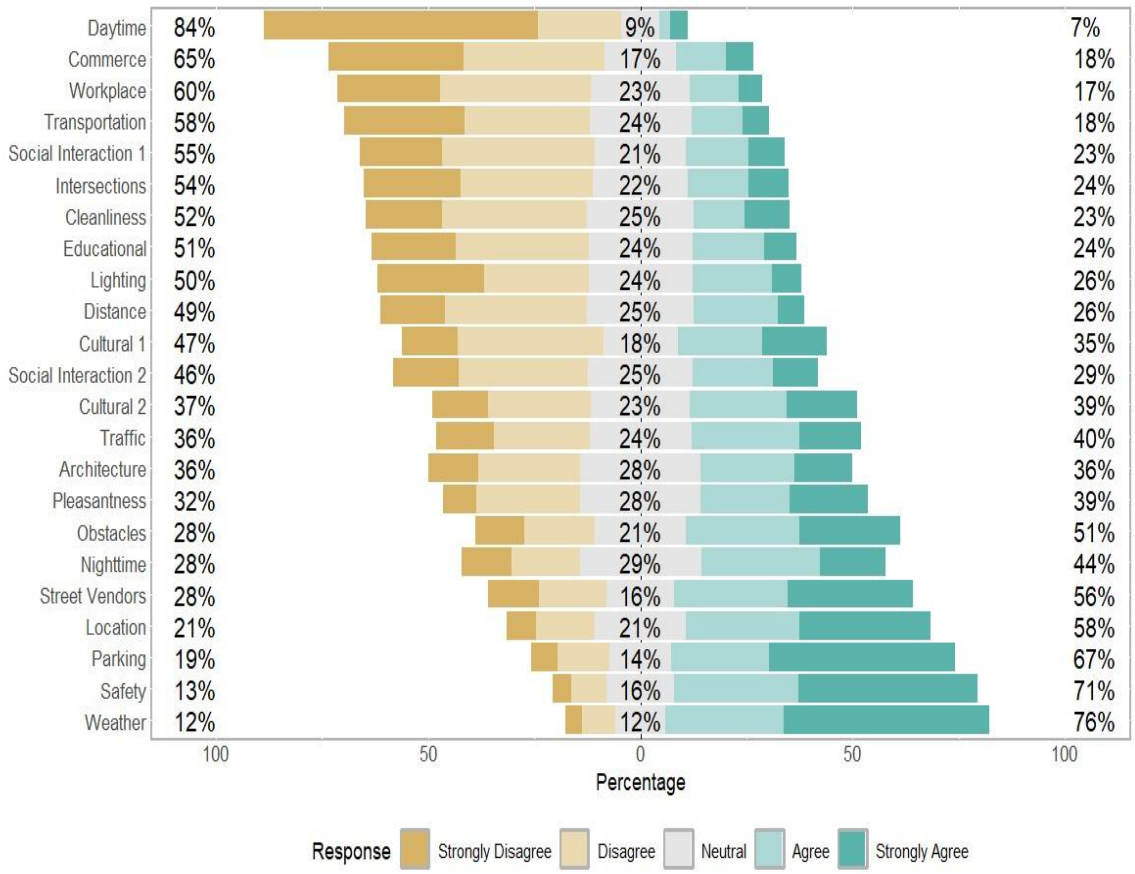

Figure 3 – Distribution of walkability variable ratings on Floriano Peixoto Avenue. Source: Research results (2024)

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Analysis of pedestrian ratings for walkability variables on Floriano Peixoto Avenue shows that the highest agreement rates are concentrated on the presence of pedestrians during the daytime (84%), followed by access to commerce (65%), accessibility to workplaces (60%), and access to public transportation (58%). These responses corroborate the avenue's central characteristic as a commercial and labor hub, with intense pedestrian traffic and a wide range of services.

On the other hand, some variables reveal significant weaknesses. The lack of protection against inclement weather has the highest percentage of negative ratings (76%), followed by the perception of safety (71%) and the number of parking spaces (67%). Aspects related to traffic (40%), cleanliness (24%), and lighting (24%) show intermediate ratings, indicating that some pedestrians perceive acceptable conditions, while others identify a need for improvements. The presence of pedestrians at night (44% disagreement) confirms the reduction in urban vitality and reinforces the feeling of insecurity during this time.

In general, it is observed that the dimensions related to connectivity and route attributes show the best performance, while those related to urban function and comfort are the ones that most compromise walking on the avenue. Figure 4, in turn, shows the means and standard deviations and the distribution of the walkability variable ratings on Floriano Peixoto Avenue.

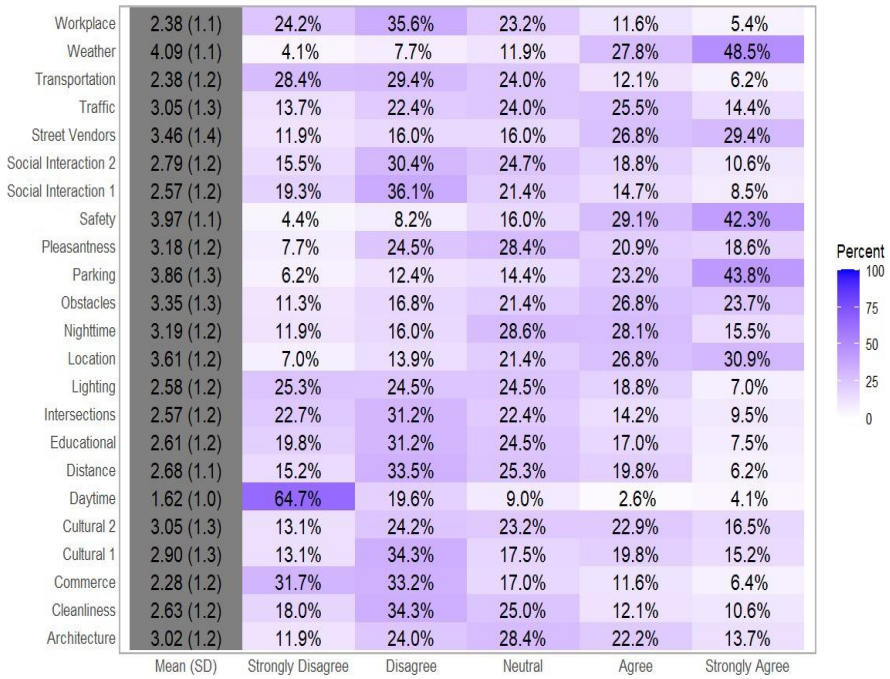

Figure 4 – Means, standard deviations, and distribution of walkability variable ratings on Floriano Peixoto Avenue. Source: Research results (2024)

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To identify the level of dispersion among the variables analyzed, Table 2 presents the coefficient of variation, with results above 30% considered to have high dispersion, and coefficients between 20% and 30% considered to have moderate dispersion.

Table 2 – Mean, Standard Deviation, and Coefficient of Variation of walkability variables on Floriano Peixoto Avenue

Dimension	Mean	SD	CV (%)	Interpretation
Transportation	3.62	1.2	33.1	High dispersion
Traffic	2.95	1.3	44.1	High dispersion
Work	3.62	1.1	30.4	High dispersion
Safety	2.03	1.1	54.2	High dispersion
Obstacles	2.65	1.3	49.1	High dispersion
Nighttime	2.81	1.2	42.7	High dispersion
Location	2.39	1.2	50.2	High dispersion
Cleanliness	3.37	1.2	35.6	High dispersion
Intersections	3.43	1.2	35	High dispersion
Weather	1.91	1.1	57.6	High dispersion
Lighting	3.42	1.2	35.1	High dispersion
Parking	2.14	1.3	60.7	High dispersion
Educational	3.39	1.2	35.4	High dispersion
Daytime	4.38	1	22.8	Moderate dispersion
Distance	3.32	1.1	33.1	High dispersion
Culture 2	2.95	1.3	44.1	High dispersion
Cultural	3.1	1.3	41.9	High dispersion
Social Interaction 1	3.43	1.2	35	High dispersion
Social Interaction 2	3.21	1.2	37.4	High dispersion
Commerce	3.72	1.2	32.3	High dispersion
Architecture	2.98	1.2	40.3	High dispersion
Street Vendors	2.54	1.4	55.1	High dispersion
Pleasantness	2.62	1.2	45.8	High dispersion

Source: Research results (2025)

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The variable that stood out most positively was the presence of people on the avenue during the daytime (64.7%), being the only variable with a moderate coefficient of variation (22.8%) and a mean of 4.38, which can be explained by the main characteristic of the avenue, which is the high density of businesses and important spaces to the city of Campina Grande, such as the historical and geographical museum, the Cine Capitólio, and the Municipal Public Theater. A similar result can be observed in Simão (2023), in which the author reports the number of people circulating on Tocantins Avenue in the city of Palmas, associating this phenomenon with the number of commercial points in the described stretch.

However, the distribution of evaluations shows contrasts between the variables analyzed. Among the aspects with the worst performance, the lack of protection against inclement weather had the highest percentage of negative responses (48.5%), accompanied by a reduced average (1.91) and a standard deviation of 1.1, indicating a widely unfavorable perception among pedestrians. In accordance with authors such as Papageorgiou et al. (2017); Kim, Lee and He (2021) and Arslan et al. (2018), protection against inclement weather is one of the pillars of walkability, as it allows people to remain on the avenue. The city of Campina Grande presents climatic variations throughout the year, with well-defined periods of sun and rain, which means that the population has specific needs throughout the year in terms of protection against these climatological changes.

The insufficiency of parking also stood out due to the high concentration of disagreement (43.8%), with an average of 2.14 and a coefficient of variation of 60.7%. Floriano Peixoto Avenue is used by both pedestrians and motorists, as seen in Table 1. Therefore, it needs to offer quality spaces for both groups, including understanding that people can reach the avenue using private transport and walk along the stretch to carry out their tasks. However, when there is no parking available, users tend to feel less motivated to walk, since they need to park their cars on distant streets, as pointed out by Fonseca (2022).

Connectivity Dimension

According to Gonzalez-Urango et al. (2020), connectivity is related to the formation of routes that generate a comprehensive network between urban spaces in which the population needs to move. For this, factors such as the presence of public transport, access to the final destination, street connectivity through alternative routes, path continuity, and path direction must be taken into account.

Based on the responses of pedestrians in the analyzed section, connectivity factors were well evaluated, such as ease of access to commerce (65%), workplaces (60%), and educational centers (52%), revealing that pedestrians consider the number of establishments offering services on the avenue to be sufficient. This

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perception is what most motivates pedestrians to walk along the avenue, given that 47.9% of pedestrians frequent the avenue for work reasons (access to workplaces), 23.45% for shopping (access to commercial establishments), and 9.28% for studying (access to educational centers). Furthermore, 49% of pedestrians considered the distance to be traveled between points on the avenue to be adequate, indicating that the main establishments they use are located at strategic points, thus facilitating pedestrian access. Tiran, Lakner, and Dribne (2019) developed a walkability model based on Geographic Information Systems, primarily focused on distance, in which the authors observed that people are only willing to walk up to 10 minutes to reach their final destination, except for emergency services such as pharmacies, where they may walk up to 30 minutes. However, this analysis was conducted in the city of Ljubljana (Slovenia), which is considered a city with a high walkability index. Considering the walkability index as a measure of people's willingness to walk on an avenue, it is possible to deduce that pedestrians on Floriano Peixoto Avenue are less willing to walk to their destination compared to the population of Ljubljana, since the overall walkability index diagnosed was average. Therefore, it is necessary to consider how to continue improving the supply of shops and services in a short period of time so that the local population can reach their destinations on foot.

Accessibility to public transport on the avenue was considered positive by 58% of respondents, given that it is a central avenue with buses that provide access to all points in the city. Regarding public transportation, pedestrians' suggestions are limited to improving the infrastructure of bus stops, as can be read in "...*the bus stops need fixing*..." and "...*the bus stops need to be renovated and rethought, as some pose dangers to passengers during rainy weather*." The second statement was cited due to a recent incident in which the roof tile covering the bus stop fell on a person while they were sheltering from the rain. Not only on Floriano Peixoto Avenue is the infrastructure of bus stops considered a critical factor for the quality of walking; Wolek, Suchanek, and Czuba (2021) identified that the availability and quality of public transport stops are essential for developing walkability in the city of Gdynia (Poland), Naharudim et al. (2020) also identify access to and performance of bus stops as crucial for pedestrian urban mobility in downtown Kuala Lumpur (Malaysia), revealing that bus stop infrastructure is fundamental to encouraging people to use an avenue via public transport and walking, which are the two main ways to promote sustainable mobility within cities, including the promotion of the right to the city.

Regarding sidewalk connectivity, defined by Gonzalez-Urango et al. (2020) as the absence of interruptions or physical elements that require a route change, 51% stated that there are obstacles that force them to change their chosen route, for example, illegal parking and sidewalks in poor condition, as can be seen

ISSN eletrônico 2177-2738
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in the following statements: "The sidewalks need fixing; I fell near here just yesterday," in which a woman stated that she did not see any unevenness in the sidewalk; "The sidewalks are horrible; they need many improvements. People could walk more. The sidewalks should be similar to those at the old reservoir and the children's park," referring to other parts of the city where there has been public concern about reforming the sidewalks. Sidewalks are people's spaces in the city, understood in Brazilian legislation as public space, characterized as a road for pedestrians along the streets (BRAZIL, Art. 99, Law 10.406 of the Civil Code). In this sense, the activity of maintaining sidewalks suitable for people should be the responsibility of the public authorities, but the Brazilian executive and legislative branches are still failing in this function. This can be justified by people's acceptance of the understanding that property owners are the "owners" of the sidewalks and responsible for their preservation, when in reality there should be social pressure on the government, establishing by law the construction and preservation of sidewalks by the public authorities, with the quality, continuity, and width of the sidewalk being considered decisive factors for encouraging walking in cities (Siqueira, 2021; Li et al., 2021; Fonseca, 2022).

The connectivity dimension was the best evaluated by pedestrians, due to the good evaluation of its variables: access to public transport, workplaces, educational centers, and alternative streets. However, the dimension had some negative points, mainly due to the presence of obstacles in the way that cause pedestrians to have to change their chosen route, such as illegal parking on sidewalks. Given this reality, the need for civic education becomes clear, in which people learn about their rights in society, including the right to the city, so that movements in favor of quality of life in cities can be initiated. Regarding the content of this research, it is important that people understand their right to access sustainable means of transportation, their right to urban public safety, and the need to hold public management accountable for the construction and preservation of sidewalks, which are public spaces for people, as well as for the oversight and guidance of citizens on how to build them.

Urban Function Dimension

The urban function dimension determines, precisely, the way the territory is used. In the walkability model proposed by Gonzalez-Urango et al. (2020), these spaces are related to parking areas for vehicles and the presence of cultural elements.

Regarding the variables that make up the urban function dimension, there was a disparity between the responses; the quantity and location of parking lots received mostly negative evaluations, 67% and 58%,

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respectively, the second being related to the proximity of parking points (Gonzalez-Urango et al., 2020). This indicates that although the term "walkability" is directly associated with walking, avenues that allow for good vehicle flow and parking points also contribute to improving sustainable street mobility. In addition to Gonzalez-Urango et al. (2020), authors such as Kelly et al. (2011), Garcia and Soria-Lara (2015), Lee et al. (2021) and Wolek, Suchanek, and Czuba (2021) also considered it relevant to study the conditions offered to drivers in traffic, especially in neighborhoods belonging to urban centers, such as Floriano Peixoto Avenue, understanding that drivers are also pedestrians in part of the route, namely, when they park their vehicles and need to move to their destinations on foot.

From another perspective, a significant portion of the survey respondents usually frequent the avenue using private cars (41%), so the insufficient amount of parking spaces may ultimately have positive effects, as people may opt for public transport over private vehicles. One pedestrian stated, "*Although I own a car, I prefer to come here by bus because driving is awful on this avenue, plus there's no parking*." In this sense, it is up to the researchers to identify to what extent the construction of parking lots favors walkability. Gehl (2013), for example, points out that the less space is built for cars, the less they are used; the opposite happens when possibilities for vehicles are expanded, for example, through the widening of highways. Based on this, a balance should be proposed between spaces for walking and spaces intended for vehicle traffic in order to encourage people to use the avenue.

Regarding cultural elements, only 35% of pedestrians agreed that there are a sufficient quantity of them, and 39% agreed that these elements are interesting. Among the avenue's cultural elements, the historical and geographical museum, the Cine Capitólio cinema, the Municipal Public Theater, and street singers stand out. Although, except for the municipal theater, the others are free, they are rarely frequented by the city's population, who show little interest in visiting and learning about the main historical points of their city. Corroborating this, pedestrians said that "*the street has cultural elements, but they are rarely visited by the public because there is nothing to attract attention*" and that it is necessary to promote "*interesting cultural programs*." Moeini (2012), in studying walkability in Tehran, the capital of Iran, identified that sociocultural factors are among the most relevant in motivating people to walk along a given stretch. The city's main cultural attractions, which have made it nationally known, are the June festivities, which occupy part of the avenue, and the winter festival that takes place in October and has its main stages installed at points along Floriano Peixoto Avenue, such as the Severino Cabral Municipal Theater and Praça das Bandeiras. However, these events are one-off events, and in addition to having a tourist focus, they do not provide artistic and cultural appeal to the

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avenue throughout the other months, meeting the needs of the avenue's true users, who are the residents of Campina Grande. Thus, it is necessary to understand what kind of programming would be interesting for the population, through public consultations, so that cultural spaces are used and generate an impact on local society.

In this way, the urban function represented by the presence and quality of parking lots and cultural elements was the one that obtained the lowest satisfaction rate, mainly due to the lack of parking and the low quality presented by the cultural elements and squares of the avenue. In this sense, urgent attention is needed from stakeholders to provide healthy environments for the population, such as squares, which, when well preserved and illuminated, invite people to walk, increasing pedestrian traffic at all times, thus increasing the population's sense of security to travel along the avenue at all times, and fostering local commerce with the presence of street vendors, allowing walking to showcase all its benefits in promoting sustainable development.

Route Attributes Dimension

Route attributes refer to the elements of the route related to the context. The elements considered important by Gonzalez-Urango et al. (2020) for the central neighborhoods were the vitality of the street, through the presence of meeting points and street vendors, density of people, and traffic conditions on the street.

The meeting spaces (squares and churches) were considered sufficient in quantity by 58% of people. However, only 46% of pedestrians responded that they were interesting, of which a considerable portion agreed with this statement because of the cathedral, located on the avenue. During the field research, pedestrians stated that the squares are in very poor condition since one of them has been taken over by drug addicts, who engage in actions that are repulsive to society, such as the use of legal and illegal drugs, as well as petty theft. Some pedestrians said that it is necessary to "renovate the squares and remove the drug addicts from there," suggesting improvements in which "the existing squares would be more attractive and more frequent with fairs of agroecological products, handicrafts, and cultural activities", promoting vitality to the avenue while encouraging local entrepreneurship through attractive and cultural activities. Moura, Cambra and Gonçalves (2017) presented a participatory assessment framework for walkability for different pedestrian groups, called Accessibility and Attractiveness Indicators of Pedestrian Environments, with the aim of supporting urban planning and design for more walkable environments. The proposed model became known internationally as the 7Cs of walkability, one of which is the presence of elements for social interaction among people walking

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along avenues. These, in turn, are vital in the formation of a sense of community, which is, in essence, the central objective of a city: to promote social life (Jacobs, 2011).

Regarding the availability of adequate and safe spaces for street vendors, capable of bringing liveliness to the avenue (Gonzalez-Urango et al., 2020), people stated that there are street vendors, however there are no adequate spaces available for them (56%), with the exception of those who obtained a license to set up in the so-called "arcas" (arks) infrastructure spaces for local vendors, built by public administrators. Concerning the others, who do not have physical space to set up, pedestrians said that it is necessary to "*build spaces for street vendors, because the sidewalks become crowded and this makes passage difficult*". This statement was collected on the sidewalk next to the ark, where the busiest bus stop on the avenue is located, in addition to dozens of street vendors walking insistently, selling products such as water and fruit, threatened with removal if they stop at any point, since this would constitute "*marking a spot*," according to one of the street vendors. Thus, to alleviate the sidewalks, which are overrun by street vendors, the following recommendation is made by pedestrians: "*Creation of appropriate spaces for street vendors*," so that there is space for them, but in a managed way.

However, Floriano Peixoto Avenue does not stand out for the presence of meeting points that promote urban vitality. The variable with the highest number of positive responses was the number of people circulating on the avenue during the daytime (84%), which can be justified by the abundance of retail stores that include clothing, footwear, household goods, pharmacies, and supermarkets. In addition, it is also where the municipal public library, the municipal theater, the commercial association, the Chamber of Store Managers, the city cathedral, informal commerce, and the central market are located. Although people say that there is pedestrian traffic during the morning and afternoon periods, only 28% agree that there is pedestrian traffic at night, reflecting the feeling of insecurity on the avenue, as can be seen in the statement of one of the respondents: "*Something that makes the night more interesting; today it's just something to stay away from*". Regarding this variable, it is important to point out that the number of people on the avenue directly interferes with people's sense of security regarding violent crimes, as observed by Yin (2013) in Buffalo, USA, a city marked by significant population loss and high crime rates in the 1980s and 1990s but which underwent a process of urban revitalization in the last decade, which made it one of the main tourist destinations in the United States, in addition to having its crime rates and sense of insecurity reduced.

Two other variables were investigated to assess the attributes of the street. The first of these is street traffic, presented by Gonzalez-Urango et al. (2020), such as the conditions offered for vehicle traffic, in which

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40% of people considered it inadequate due to the lack of appropriate signage, speed monitoring systems for vehicle control, and especially vehicle congestion during peak hours, as can be read in the statement: "*The avenue is very busy and does not have adequate signage. Traffic needs to be relieved; it is difficult to walk and especially to cross the streets because of the number of cars passing by*". With this, it is possible to perceive that this is a limiting factor for walking on the street, and to solve it, the creation of an overpass was suggested, as described in the recommendation "*Build another overpass to relieve vehicle traffic*". Although this suggestion comes from the population, Gehl (2013) explores cases of cities that have increased the flow of vehicles, resulting from the widening of avenues and the construction of highways, which, to some extent, only contributes to the inversion of values in traffic that is already so present in the current Brazilian context, in which vehicles are prioritized over pedestrians, when the government takes responsibility for the construction of highways but forgets to restore the sidewalks on the avenues.

Considering these elements, in the route attributes dimension, the results were similar between pedestrians who considered the variables sufficient and those who considered them insufficient. This result was generated by variables with a high positive index, such as the number of pedestrians during the day, and variables with very negative results, such as the availability of space for street vendors and the quality of the traffic system on the avenue. In this sense, actions need to be proposed to balance this equation, that is, to improve the factors that have received negative evaluations, without neglecting those already considered positive, for example, structuring new methods for the flow of automobiles, such as the implementation of traffic lights and information signs, and proposing policies for the creation and distribution of spaces for street vendors in a fair way.

Comfort Dimension

Gonzalez-Urango et al. (2020) define comfort for walking on urban roads as the aesthetics of the avenue, the feeling/perception of pedestrians in relation to the road, and personal safety. Therefore, in the comfort dimension, the following variables were analyzed: avenue cleanliness, related to the perception of a pleasant and beautiful environment, through the maintenance of cleanliness; public lighting, evaluated by the level of lighting available at all times; urban architecture, represented by the attractiveness from an architectural and urban planning point of view, transparency, and permeability of public-private space; pleasantness, seen through attributes that generate less stress or a pleasant feeling of being relaxed; elements of protection against

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inclement weather, associated with urban structures capable of protecting pedestrians against climatic factors, such as rain and sun; and the feeling of safety (Gonzalez-Urango et al., 2020).

Regarding the cleanliness of the avenue, 52% of pedestrians stated they were satisfied, while 23% disagreed that the analyzed section was clean, even though the municipal government promotes cleaning of the avenue twice a day, precisely so that it appears beautiful and pleasant to the citizen. This variable is one of the most relevant to the pleasantness of an avenue, being discussed by Kelly et al. (2011), Arslan et al. (2018), Majumdar et al. (2021), Saadi et al. (2021) and Nabipour, Rosenberg and Nasseri (2022). In the study carried out by Saadi et al. (2021), for example, it was considered by pedestrians in Brussels, while Nabipour, Rosenberg and Nasseri (2022), in addition to cleanliness, included gardening as a reference to the perception of hygiene of the avenue. However, the results show a discrepancy between the frequency of cleaning actions carried out by the public authorities and the perception of a significant portion of users, indicating that the periodic execution of the service, by itself, does not guarantee a sense of hygiene and pleasantness in the urban space. This divergence suggests that other factors, such as waste management throughout the day, user behavior, and the presence of poorly maintained vegetation, can negatively influence pedestrians' perception. Thus, cleaning the avenue ceases to be merely an operational issue and becomes an urban management challenge, demanding strategies that consider both the physical maintenance of the space and the daily experience of citizens.

Regarding the aesthetics of the streets, 36% agreed that it is pleasant, while another 36% disagreed with the same statement. The aesthetics of the area covered by the study are mainly composed of historical buildings and commercial establishments. Regarding historical landmarks, Campina Grande is one of the cities with the most elements recognized as historical heritage in Brazil; however, the buildings are crumbling due to a lack of investment in maintenance by the public authorities. Therefore, the following suggestion was made: "The historical houses are being destroyed; they need inspection. The paint on the historical buildings needs fixing..." Thus, due to the perceived neglect, people no longer see these elements as attractive, and they are not considered inviting factors when choosing a route, as one pedestrian stated: "There was a collapse near the city hall that needs fixing; the historical part is being lost, and this affects the attractiveness of the avenue." Declaring a building as historic and registering it as a protected heritage site is not just about signing an official document but about committing to managing that space and preserving it for the identification of a place's past. Thus, it is up to managers to develop public policies aimed at maintaining the city's historical heritage, especially that located on the main avenue.

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Regarding the availability of protection against weather events, 76% of people disagreed that there is a sufficient quantity. Of these, 48.5% disagreed completely, this being the factor with the highest rate of disagreement. During the on-site questionnaire applications, testimonies were heard of awnings covering bus stops falling during rain, when people were sheltering under them, in addition to pedestrians who reported waiting for the bus in the sun due to a lack of space to shelter under the bus stop awning. The city of Campina Grande experiences climatic variations throughout the year, with well-defined periods of sun and rain, which means that the population has specific needs throughout the year for protection against these climatological changes. Thus, although these structures are intended to protect pedestrians from adverse events, some pedestrians report that they are doing the opposite, that is, worsening the living conditions of those who take shelter in their facilities.

According to Gonzalez-Urango et al. (2020), the feeling of security is related to the individual's own assessment of their state of being and feeling safe from harm or danger. Thus, 71% of respondents reported not feeling safe walking along the avenue. Regarding the feeling of safety, pedestrians responded as follows: "*There needs to be more safety for pedestrians, both in relation to violence and in relation to the condition of the sidewalks*," demonstrating a perceived lack of safety in relation to both harm and the dangers caused by urban violence. Other pedestrians said, "*More security needs to be put on the street, such as increased policing*," and "*Security needs to be improved; I think that's the basic point for people to feel good walking around here. The other things are important, but they are secondary…*" revealing that, although pedestrians recognize the other factors as necessary, security needs to be a fundamental activity for promoting walkability (Zuniga-Teran et al., 2019; Alkheder et al., 2022; Arellana et al., 2022; Nabipour; Rosenberg; Nasseri, 2022; Fonseca, 2022).

One factor associated with the feeling of safety is public lighting, especially at night, which is empirically understood to be the most dangerous time. Regarding the section of Avenida Floriano Peixoto analyzed, 50% of pedestrians agreed that it has adequate lighting at all times, and only 24% disagreed with the statement. Regarding those who disagreed that the avenue was adequately lit at all times, comments such as the following were heard: "*There should be more lighting at night, precisely to increase the feeling of security, especially after the Rede Compras supermarket*"; "*I think it's a very beautiful, charming avenue, but I believe it should have more lighting at night and security, especially in the part near the overpass (after the Rede Compras supermarket)*"; "*...improve the lighting at night, because sometimes there are streetlights that are off at night, facilitating robberies.*" From these statements, the association made by pedestrians between public lighting and security on the avenue is evident, highlighting that walking at night on the avenue in question is to be exposed to risk.

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The accounts show that specific lighting failures, especially at night, compromise the sense of security for pedestrians, indicating the need for targeted interventions in specific sections of the avenue.

Considering this, in the comfort dimension, a prevalent rate of insufficient and very poor evaluations is observed. Factors such as protection against inclement weather, sense of security, and lighting at all times stand out, all of which were negatively evaluated by the majority of pedestrians. With the exception of protection against inclement weather, to improve the variables that affect the comfort dimension, it is necessary to work on the variables related to the other dimensions. For example, in order to improve the sense of security for pedestrians, especially at night, it is necessary to revitalize the street with lighting and nightlife, for example, by promoting squares bustling with artistic and cultural activities that are interesting to the population.

IV. CONCLUSIONS

Walkability is one way to promote quality of life for people in urban environments, since more walkable environments contribute to a number of benefits for human life, such as those associated with physical health (reduction of fat levels and blood pressure), psychological well-being, and financial well-being, as it is a less expensive means of transportation. Thus, although it is a fundamental function of cities to promote the well-being of their citizens, this has not always been a priority on political agendas.

Starting from the premise that walkability studies should include the pedestrian's perspective and focusing on the stretch from the Severino Cabral Municipal Theater to the viaduct, located in the center of Campina Grande, this work was carried out in order to evaluate the walkability conditions in the central section of Avenida Floriano Peixoto, the main avenue of Campina Grande-PB, from the pedestrian's perspective. Based on the research results, it was possible to see that there are variables considered critical points on the avenue, requiring urgent repairs, but there are also variables that are in acceptable condition, according to pedestrians. The first concerns the presence of elements that protect pedestrians from weather conditions, public safety, and the presence and location of parking areas. Regarding the variables with positive evaluations, the density of pedestrians during the morning and afternoon periods stands out, acting as a moderating factor in the feeling of safety during these times, as well as the ease of access to destinations and public transportation.

Based on the results of this research, it is suggested that municipal managers in the city of Campina Grande should seek, through public consultations, to understand the needs of pedestrians and plan public policies focused on the points raised by them. Ultimately, the research shows the need to plan the city according

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http://dx.doi.org/10.5380/raega.v65i1.103168

to the wishes of its citizens in aspects beyond urban mobility, such as housing, without excluding the perspective of experts but including the local community in the decision-making process.

Considering that the walkability conditions of only one section of the city were analyzed, it is recommended that other researchers investigate the needs of pedestrians in other neighborhoods of the city, so that this research strengthens the urban mobility agenda in the formulation of local political agendas.

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http://dx.doi.org/10.5380/raega.v65i1.103168

ISSN eletrônico 2177-2738
RA'EGA, Curitiba, PR, V.65, n.1, p. 90 – 116, 4/2026
http://dx.doi.org/10.5380/raega.v65i1.103168