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What is the Perception of Brazilians Regarding Green Urban Spaces?

Qual a Percepção dos Brasileiros em Relação às Áreas Verdes Urbanas?

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Abstract

Urban green spaces are essential for the quality of life of people living in cities. These areas provide ecosystem services such as temperature reduction, improved air quality, and rainwater absorption, among others. The objective of this study is to identify Brazilians' perceptions of green spaces and the provision of ecosystem services. To that end, the literature was used to create an online questionnaire that was distributed to 511 people in the state of Mato Grosso do Sul. The snowball structure was used to collect data. A factorial analysis was performed on the collected data, in addition to the use of descriptive statistics and non-parametric tests for the treatment of the collected information. The findings revealed three factors in relation to green areas: i-The benefits of having parks in the urban area; ii- The impact of green spaces on human health; and iii- The problems caused by urban green spaces. The respondents' perception of the first factor is neutral; however, when it comes to the second factor, the participants agree on the importance of urban green spaces and the benefits they provide to human health. Furthermore, it was found that women's perception differs from men's; the literature believes that this difference can be explained by women having greater sensitivity to environmental issues than men.

Keywords*:* Ecosystem Services; Parks; Green Spaces.

JEL Code: Q50; Q53.

Resumo

Áreas verdes urbanas são essenciais para a qualidade de vida das pessoas que residem nas cidades. Estas áreas prestam serviços ecossistêmicos que possibilitam por exemplo, a redução de temperatura, melhoram a qualidade do ar e facilitam a absorção das águas das chuvas, entre outros. A partir deste contexto, o objetivo deste estudo é identificar a percepção que os brasileiros têm sobre as áreas verdes e a prestação de serviços ecossistêmicos. Para tal, utilizou-se a literatura para a elaboração de um questionário online, aplicado a 511 indivíduos, residentes em Mato Grosso do Sul. A coleta de dados seguiu a estrutura bola de neve. A partir dos dados coletados, foi realizada análise fatorial, além da utilização de estatística descritiva e testes não paramétricos para o tratamento das informações coletadas. Os resultados apontaram em relação as áreas verdes, três fatores: i- Benefícios da existência de parques na área urbana; ii- Influência das áreas verdes na saúde humana; e iii- Problemas causados pelas áreas verdes urbanas. A percepção dos respondentes é neutra quanto ao primeiro fator, porém, quanto ao segundo fator, os respondentes concordam com a importância da existência de áreas verdes urbanas, bem como, com os benefícios que trazem à saúde humana. Além disso, identificou-se que a percepção das mulheres é diferente dos homens, a literatura considera que esta diferença pode ser justificada por as mulheres terem maior sensibilidade as questões vinculadas a natureza se comparado aos homens.

Palavras-Chave: Serviços Ecossistêmicos; Parques; Áreas Verdes.

Código JEL: Q50; Q53.

1. INTRODUCTION

The majority of people live in urban areas, accounting for approximately 54% of the global population (EEA, 2015). As a result, urban space planners face a significant challenge in providing the population with a high-quality environment that improves people's quality of life (Ostoic et al., 2017). Even more so when one considers how, from a psychological and social standpoint, an individual's relationship with green spaces influences their behavior and health (Gomes, 2005). Thus, green spaces, particularly those in urban areas, allow people to interact with nature. This experience teaches individuals about the benefits that nature provides them on a daily basis, such as fresh air, sunlight, water, the elements that make up flora and fauna, and other benefits known as ecosystem services (Irvine et al., 2013), i.e., the benefits that humans receive from nature directly or indirectly as a result of ecosystem functions (Costanza et al., 1997).

In previous studies conducted in countries such as the Netherlands and Greece, it was found that people who frequent urban parks perceive the benefits that these places bring to society due to their contributions to human health (Chiesura, 2004; Latinopoulos et al., 2016). In this context, urban parks can be defined as an intentional space composed of vegetation cover and public spaces for leisure, sports, social interaction, culture, among others (Lagbas, 2019).

Moreover, urban green spaces are frequently protected areas, and their existence benefits the promotion of biodiversity conservation (Venter et al., 2017), contributing to the challenge that cities face as a result of population growth and the effects of climate change in incorporating sustainability and people's well-being into local development planning (Leichenko, 2011; Baker, 2012). Furthermore, the lack of contact between people living in urban areas and the natural environment has been identified as a growing concern in previous studies (Chen et al., 2008; Wright Wendel, 2011; Wright Wendel et al., 2012), indicating the importance of green spaces as a strategy for improving human health. However, the presence of these areas must be accompanied by the implementation of a management system that considers the planning and execution of measures to ensure environmental quality standards (Garcia, 2017).

In this study, we investigate Brazilians' perceptions of green spaces and their potential to provide ecosystem services. Primary data were collected and analyzed using factorial analysis and descriptive statistics to obtain the results. Natural ecosystems are recognized for contributing to human life through the provision of services, and these are essential to human survival, as they are responsible

for the production of food and raw materials, water and nutrient cycling, water purification, climate regulation, erosion control, and even aesthetic and spiritual benefits (Daily, 1997) (MEA, 2005; Fiquepron et al., 2013). However, these services are deteriorating over time as a result of land use change (Brauman et al., 2014; Yan et al., 2016; Song et al., 2017) (Zhan et al., 2019). In this context, studies on people's perceptions and behaviors have helped to solve local problems (Ioja et al., 2011; Arnberger, 2006), as well as in the formulation of policies, planning, and management of cities in order to manage natural resources and attract financial resources that are then used in actions to improve people's quality of life (Ostoic et al., 2017).

Following this introduction, which contextualizes issues and presents the study objective, this article presents a review of urban green areas, then the materials and methods used, the results and discussion, the final considerations, and finally the references.

2. CHARACTERIZATION OF GREEN AREAS IN URBAN SPACE

Green spaces, also known as green infrastructure, have grown in popularity as places that provide numerous benefits to pepole. Their records are related to various benefits, such as climate change mitigation, habitat improvements, heat island reduction, increased human health and well-being, and land regeneration, among others (Forest Research, 2010). Heat islands in urban areas are associated with existing infrastructure and can be more intense and frequent as green space is reduced or eliminated (Lopes et al., 2022). Furthermore, urban green spaces convey the idea of peaceful spaces, which can be described as a soundscape with a predominance of natural sounds and a low level of artificial noises (Watts, 2017). Moreover, there have been studies that have revealed a link between quiet environments, stress reduction, well-being, and people's longevity (Lechtzin et al., 2010; Hunter et al., 2010; Van Den Berg et al., 2015).

These natural benefits are the result of the functions and services that ecosystems provide to people, which meet both material characteristics, such as food production, and spiritual characteristics, such as religion (De Groot, 1992). However, studies on the effects of urbanization on ecosystems have been conducted since the 1990s (Likens et al., 2012), and it has been revealed that the existence of quality of life in the urban area, among other characteristics, is dependent on the ecosystem services created by the natural components present in the location (González-Oreja et al., 2010). It is worth noting that these spaces are made up of areas with varying characteristics which all share the presence of vegetation, located in large or small areas, on the outskirts or in the center, as well as in rural areas, and there may or may not be densification of the surrounding population (Maruani; Amit-Cohen, 2007). Green spaces, because they are usually public spaces, also contribute to social interaction, often from different social groups, ethnicities, and ages, facilitating social cohesion (Peters et al., 2010; Krellenberg et al., 2014).

In general, studies on green spaces consider the demographic and socioeconomic characteristics of users and those who live nearby (Cohen et al., 2012; Chiabai et al., 2020). There are also those who look into accessibility, or the proximity of the sites to the population, as well as the physical characteristics of green spaces (Peschardt; Stigsdotter, 2013; La Barrera et al., 2016). Another issue is the importance of infrastructure for the availability of activities and facilities that allow people with special needs to access it, as well as the safety of these places (Schipperijn et al., 2010; Benzon, 2018), in addition to the studies already cited, which consider the benefits that natural environments bring to people's health. However, considering the social bias, identifying people's perceptions of green spaces is one of the most important topics to study (Ostoic; Van Den Bosch, 2015), which has been still little explored in Brazil, particularly in the Midwest region. These spaces are frequently used to generate employment and income in municipalities, for example, through tourist activities, with the activities benefiting from the thermal comfort generated by green spaces (Lopes et al. 2021).

It is observed that, while the benefits of different green areas to people are recognized, the change in land use that contemplates the process of replacing natural vegetation for other uses continues to occur. The reasons for the situation differ, such as the urbanization process itself or food production (Pham et al., 2012; Curtis et al., 2018; Kubitza et al., 2018). As a result, researching what green spaces represent to people may help to keep these spaces in proper condition. People's perceptions of the natural environment are subjective and vary from person to person (Hernández-Morcillo et al., 2013; Langemeyer et al., 2015), so individual interpretations of positive and negative issues related to green spaces may exist, posing a research challenge (Kothencz; Blaschke, 2017).

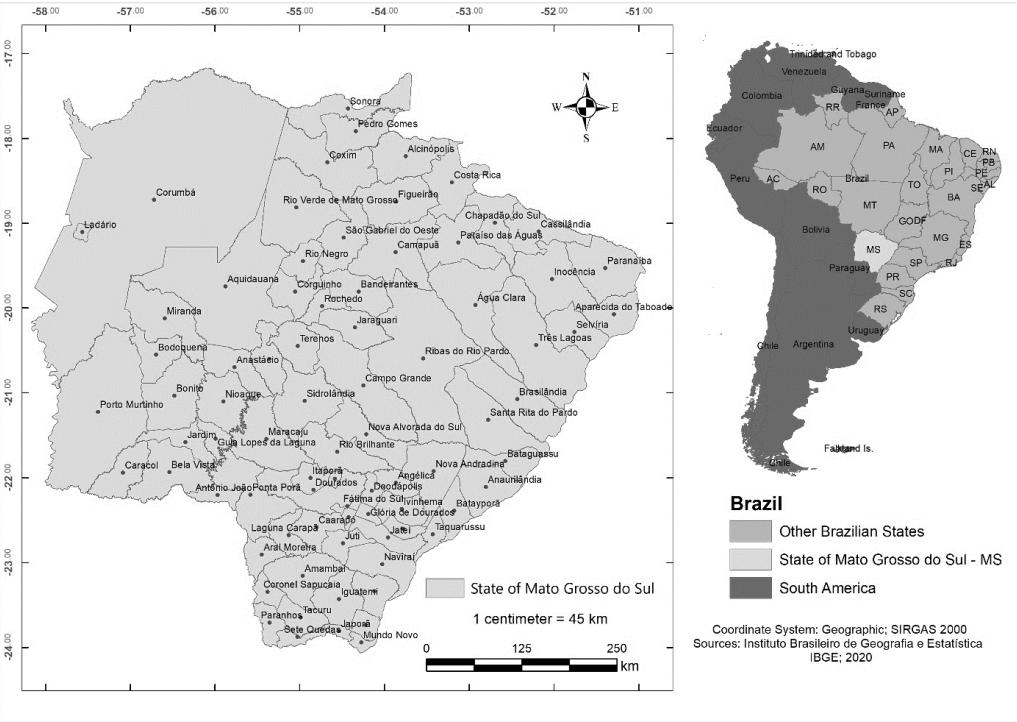
These studies are conducted in specific locations, such as the United States, and focus on cognitive, affective, and behavioral components (Baur et al., 2013). In Germany, researchers investigated people's perceptions of the soundscape associated with green spaces (Liu et al., 2019). Also in China, in terms of green space design and ecosystem services (Jim; Chen, 2006). In Portugal, Lopes et al. (2021) found differences in perception between tourists and laborers who work in green areas.

3. MATERIALS AND METHOD

3.1 Initial characteristics of the study

The research was conducted in the Brazilian state of Mato Grosso do Sul (Figure 1), which is located in the country's Midwest region. This state has made significant contributions to the country's agricultural production, and more than 56% of its territory was used for agricultural production in 2018. (MAPBIOMAS, 2020). Thus, the vast majority of its land is designated for this purpose.

Figure 1: Location of the state of Mato Grosso do Sul.



Mato Grosso do Sul is biogeographically composed of three of Brazil's five biomes: i-Cerrado, ii-Atlantic Forest, and iii-Pantanal. This emphasizes the importance of the state's natural biodiversity. In terms of urban characteristics, it is also observed that 95.7% of households in the state have trees in their surroundings (IBGE, 2010), indicating the presence of vegetation in the urban area.

3.2 Data Collection and Statistical Treatment

For identifying the perception of residents in Mato Grosso do Sul regarding green spaces and ecosystem services, a questionnaire was prepared after a careful reading of the following works: Sanesi et al. (2006), Larson et al. (2016), Loft et al. (2017), Ostoic et al. (2017), Collins et al. (2019), and Moros et al (2020). From May to June 2020, 511 people took part in a survey, completing an online questionnaire created by Google Docs. The snowball structure was used for data collection so that participants from all over the state could be included in the research. The questionnaire was divided into three stages: the first refers to personal characteristics, the second to urban green spaces, and the third to ecosystem functions (regulation, habitat, production, and cultural

services) (COSTANZA et al., 1997). In the second step, the participants needed to rate the statements, considering 1 when "totally disagreed" and 5 when you "totally agreed". Table 1 summarizes the data gathered about green spaces.

Table 1: Information about urban and rural green areas.

Urban green spaces
V1-It is important to have green spaces in cities; V2-In order for people to relax, the city needs more green spaces; V3-In order to be healthy, people need more green spaces in the city; V4-In my city, urban parks provide a space for outdoor recreation activities; V5-In my city, urban parks remind me of the beauty of nature; V6-In my city, urban parks have historical records; V7-In my city, urban parks provide an important habitat for plants and animals; V8-In my city, parks help to bring people from different neighborhoods together; V9-In my city, I feel safe visiting parks; V10-The government has abandoned the parks in my city; V11-More green spaces are needed in my city; V12-I believe that green spaces should not exist in the urban area; V13-Green spaces aggravate allergies and diseases; V14-Tree roots in green spaces break the sidewalks; and V15-Trees generate trash.

Next, the set of answers attributed to the items was factor analyzed. Factor analysis is used when there is a large number of variables and one wants to group them, as in this case. This analysis was carried out using the "Principal Components" technique. The Kaiser-Meyer-Olkin - KMO test and Bartlett's sphericity test were used to determine whether factor analysis could be performed. The eigenvalue greater than one was used as a criterion to define the number of factors. When items had factor loadings greater than 0.5, they were included in a factor (HAIR et al., 2009). Queiroz et al. (2018) have used this statistical technique to identify Brazilian people's perceptions of animal welfare.

Subsequently, the Cronbach's alpha coefficient was calculated to estimate the reliability of the identified factors, i.e., the interdependence of the variables. In terms of the coefficient's result, the closer it is to 1.0, the more consistent the results presented (PINTO et al., 2014). To complete this step, the average of the elements that comprise each factor with an alpha greater than 0.6 was calculated. A high Cronbach's alpha (> 0.6) indicates that the set of grouped statements can be added together, with the average representing the construct (BRUIJNIS et al., 2013). This metric assisted in determining respondents' attitudes toward urban green spaces.

Following the selection of variables, the Mann Whitney test was used to confirm differences in participant perceptions of the set of variables grouped into factors, according to gender and place of residence, whether rural or urban. A $p<0.05$ was used to denote statistically significant differences. This procedure was previously used by Ostoic et al. (2017).

In the third step, the respondents needed to rate the statements, referring to ecosystem services that can be performed in urban areas, considering 1 when "totally disagreed" and 5 when you "totally agreed". According to Bolund and Hunhammar (1999), the variables were defined using services considered essential to urban residents, such as: 1) flood control; 2) air filtration; 3) microclimate regulation; 4) rainwater drainage, and 5) sewage treatment. The statements are listed in Table 2.

Table 2: Variables referring to ecosystem functions.

Ecosystem Functions in urban green areas and other characteristics
V1- Green spaces reduce pollution; V2- Green spaces regulate climate; V3- Green spaces limit rainwater accumulation and prevent flooding; V4- Green spaces provide habitats for wildlife; V5- Green spaces make the urban space good-looking; V6- Green spaces reduce heat; V7- Green spaces contribute to soil fertility; V8- Green spaces contribute to the preservation of streams, lakes, and rivers.

These variables were correlated using Spearman's correlation, a procedure previously adopted by Ko & Son (2018).

4. RESULTS AND DISCUSSIONS

Out of a total of 511 survey participants, 56% of the survey participants are female and 44% are male. In terms of age, 20.5% are between the ages of 15 and 25, 40% are between the ages of 25 and 35, 28% are between the ages of 35 and 45, 8.5% are between the ages of 45 and 55, and 3% are over 55 years old. Regarding education, 4% have completed elementary school, 18% have

completed high school, 24% have a college degree, and 54% have finished graduate studies. These people live in various parts of the state of Mato Grosso do Sul. The majority of them (96.5%) reside in the municipalities' urban areas. Furthermore, 82% of participants believe they understand what an ecosystem service is, and 97% agree that ecosystem services are the benefits that nature provides to people. This simplified concept to define ecosystem services, can be identified in Erickson and Ernest (2011); Millennium Ecosystem Assessment (2005) and Balmford et al. (2015).

The factor analysis revealed that three factors with eigenvalues greater than 1.0 explained 63.7% of the total variance. The factors were named as follows: i- The benefits of having parks in the urban area, ii- The impact of green spaces on human health, and iii- The problems caused by urban green spaces (Table 1).

Table 1: Factor loading matrix for the perception items with factor loadings greater than 0.5, in bold.

Items*	F1[a]	F2[b]	F3[c]
V1	0.076	**0.827**	-0.035
V2	0.124	**0.792**	-0.02
V3	0.144	**0.854**	-0.017
V4	**0.802**	0.084	0.008
V5	**0.873**	0.033	0.006
V7	**0.784**	0.045	-0.017
V8	**0.804**	0.097	0.044
V9	**0.71**	0.054	0.121
V11	-0.046	**0.706**	-0.039
V13	0.09	-0.193	**0.703**
V14	-0.044	0.101	**0.792**
V15	0.073	-0.019	**0.812**
Explained Variance (%)	26.9	21.7	15
Eigenvalue	3,230	2,610	1,802

a – The benefits of having parks in the urban area;

b - The impact of green spaces on human health;

c – The problems caused by urban green spaces.

KMO = 0.788 and Bartlett's Test of Sphericity p-value = 0.000

*All items with value lower than 0.5 were excluded.

The first factor describes study participants' perceptions of the benefits of having parks in urban areas, and the second participants' perceptions of the relationship between green spaces and health benefits. The items that comprise these factors were formulated positively, so the higher the score given by participants, the more they agree that green spaces contribute to the quality of life of people living in the urban area. The third factor describes participants' perceptions of the problems that the presence of green areas can cause in the urban context. The items that encompass these factors were also positively formulated, so the higher the score given by participants, the more they agree that the presence of green areas can cause negative situations in the urban area.

Cronbach's Alpha was used to assess factor reliability. The results identified for each factor, were, respectively: i-0.857, ii-0.795 and iii-0.661, values higher than 0.6, as indicated by Bruijnis et

al. (2013). Descriptive statistics on the statements used to assess participants' perceptions of urban green spaces are available on Table 2.

Table 2: Descriptive statistics of the statements used to measure perceptions of urban green areas.

Item	Description [a]	F1 MD (SD)	F2 MD (SD)	F3 MD (SD)
V1	It is important to have green spaces in cities		4.8 (0.6)	
V2	In order for people to relax, the city needs more green spaces		4.4 (0.8)	
V3	In order to be healthy, people need more green spaces in the city		4.6 (0.7)	
V4	In my city, urban parks provide a space for outdoor recreation activities	3.5 (1.2)		
V5	In my city, urban parks remind me of the beauty of nature	3.3 (1.3)		
V7	In my city, urban parks provide an important habitat for plants and animals	3.1 (1.3)		
V8	In my city, parks help to bring people from different neighborhoods together	3.3 (1.3)		
V9	In my city, I feel safe visiting parks	2.9 (1.4)		
V11	More green spaces are needed in my city		4.5 (0.9)	
V13	Green spaces aggravate allergies and diseases			1.3 (0.8)
V14	Tree roots in green spaces break the sidewalks			1.9 (1.1)
V15	Trees generate trash			1.5 (1.0)

MD - Mean; (**SD**) - Standard Deviation; **Number of Participants** - 511

a- All statements were measured using a Likert-type scale (1: strongly disagree; 2: disagree; 3: neutral; 4: agree; 5: strongly agree).

The mean for statements related to F1 (V4, V5, V7, and V9) was close to 3.0, indicating that participants have a neutral perception of the benefits of having parks in the urban area. The mean for statements related to F2 (V1, V2, V3, and V11) was greater than 4.0, indicating that participants agree on the importance of urban green spaces and the benefits they provide to human health. Finally, the statements related to F3 (V13, V14, and V15) produced a mean value less than 2.0, indicating that the participants do not agree that urban green spaces cause problems.

Concerning the neutral opinions, there are some considerations that can help understand why people choose these answers. This option has been observed to be used when people want to avoid the cognitive effort of selecting a satisfactory answer (Krosnick et al., 2002), or even when they want to avoid committing themselves (Oppenheim, 1992). Another reason is when they are unable to choose between their positive and negative feelings about the issue (Nowlis et al., 2002), or when people have not formed opinions on the subject (Domingues et al., 2020). Although the questions presented in this study cannot be tested, it is assumed that the participants do not have a well-formed opinion on the subject to which the positioning was neutral, given that the parks' quality may be questionable. This question is justified because it has been determined in Brazil that the environmental issue is complex and relatively new to the country. Initially developed in response to international demands in the 1960s, Brazilian environmental policy was frequently subjugated by economic interests related to industrialization and the country's progress (Paccatielo, 2011). Even with specific legislation, the conflicts of area management have not yet been resolved (Accioly; Sánchez, 2012), and it is noticeable that it has gained more space in social discussions over the last three decades (Paccatielo, 2011).

Furthermore, the items grouped in the first factor, which yielded a neutral result, are directly or indirectly related to park infrastructure. The structure available for use may have influenced the perception of research participants. Even though many municipalities in Brazil have urban park management plans, the spaces are degraded due to a lack of preservation, a lack of resources, or negligence with the area (Costa, 2010; Brandli et al., 2014). States and municipalities are in charge of the management, preservation, and protection of these areas (Macedo, 2003). However, public budgets are frequently reduced, making it difficult to have tax resources available to fund urban park maintenance (Neckel et al., 2020). Regarding Mato Grosso do Sul tax collection, Bernardo et al. (2018) corroborate the information presented, identifying from the FIRJAN Fiscal Management Index - IFGF of 2016, that in relation to the collection of municipalities' own revenue, the localities were classified as critical, i.e., the lowest classification in this index. Another observation is the same classification for investments, which represents the low availability of resources for municipal improvements.

Additionally, the findings of this study support previous statements about the benefits of green spaces to human health. The academic literature recognizes that green spaces help to promote physical activities, which benefits the population's physical health (Kaczynski et al., 2008; Hartig et al., 2014). Furthermore, green spaces, such as parks, have contributed to changes in the stressful routine that urban people face every day (Ulrich et al., 1991), implying that green spaces benefit people's mental health (Lechtzin et al., 2010; Hunter et al., 2010; Van Den Berg et al., 2015). Participants in this study emphasized the importance of green spaces in urban areas and how they benefit human health.

Another issue raised in the study is the harm that green spaces can cause to people, also known as ecosystem disservices (Dunn et al., 2010; Escobedo et al., 2011). Sidewalk damage caused by exposed tree roots (Tyrvainen, 2001), the presence of disease vectors (LI et al., 2018; ZHANG et al., 2019), and allergies (Maya-Manzano et al., 2017; Lara et al., 2019; Velasco-Jiménez et al., 2020) are among them. The participants in the study assumed that they had a different perspective on this. As a result, they disagree that urban green spaces can have these characteristics. According to the findings of Ostoic et al. (2017)'s study on allergenicity, this perception may be due to people's lack of knowledge on the subject. Alternatively, there are other issues associated with urban green spaces that are more easily identified, such as the case of people who frequent these areas with pets (dogs) and do not take all necessary precautions to avoid causing nuisances to other individuals.

The Mann-Whitney (U) test was then used to determine place of residence (urban and rural) and gender. The test revealed that participants' perception of urban green spaces is unaffected by their place of residence (F1 U= 3299.00; p> 0.05; F2 U= 4142.00; p> 0.05; F3 U= 3869.00; p> 0.05). Gender had no effect on perception for factors F1 (U= 29288.50; p>0.05) and F3 (U= 31450.50; p>0.05). However, for F2 (U= 27894.50; p0.05), the test demonstrates that gender has an effect on the perception of the participants. The mean value of the ranks for Factor 2 (female 270.64 and male 237.09) indicates that the majority of female participants have significantly higher levels of perception than the male participants group.

According to the findings of Chen et al. (2020), the female gender is more pleased with urban green structures than the male gender. According to the authors, and supported by Miller et al. (2007) and Slama et al. (2008), this fact may be related to women's greater sensitivity to environmental conditions. It is worth considering that public managers should incorporate not only green spaces, but also the quality of these spaces for the provision of ecosystem services, into municipal urban design (Gozalo et al., 2019). The World Health Organization (2016) emphasizes the benefits that these areas can provide to public health and encourages initiatives to expand these spaces (Who, 2016).

Table 3: Correlation Results

	V1	V2	V3	V4	V5	V6	V7	V8
V1	1							
V2	0.618**	1						
V3	0.566**	**0.714****	1					
V4	0.533**	0.554**	0.625**	1				
V5	0.546**	0.574**	0.645**	0.612**	1			
V6	0.590**	0.696**	0.673**	0.569**	**0.722****	1		
V7	0.560**	0.646**	0.610**	0.610**	**0.707****	**0.746****	1	
V8	0.569**	0.660**	**0.710****	0.656**	**0.732****	**0.786****	**0.758****	1

V1- Green spaces reduce pollution; V2- Green spaces regulate the climate; V3- Green spaces limit rainwater accumulation and prevent flooding; V4- Green spaces provide habitats for wildlife; V5- Green spaces make the urban space look nice; V6- Green spaces reduce heat; V7- Green spaces contribute to soil fertility; V8- Green spaces contribute to the preservation of streams, lakes, and rivers.

n = 511; *p <0.05; **p <0.01). Bold text indicates strong positive correlations (≥0.70).

5. FINAL CONSIDERATIONS

Studies on urban green spaces have found a place in scientific publications, owing to the importance of green spaces in improving the quality of life for people living in cities. These advantages are associated with the provision of ecosystem services by urban vegetation. Hence, the goal of this study was to determine Brazilians' perceptions of green spaces and the provision of ecosystem services. The approach taken in relation to people's perceptions of urban green space included both positive and negative issues. Concerning the positive issues, it was clear that participants recognized the benefits of urban green spaces to physical and mental health. If people have the opportunity to voice their concerns to public officials, this question may encourage the expansion of urban green spaces.

Concerning the negative aspects, participants did not associate green spaces with potential problems, such as allergies caused by plants planted in urban green spaces. Furthermore, information about urban parks presented a neutral perception, and several of the analyses performed revealed statistically significant differences in perception. These last considerations may be the focus of public managers' investments in new knowledge about urban space and local vegetation.

New studies may consider a larger sample in relation to the country or region, given that the infrastructure of green spaces in Brazil may differ due to existing biodiversity and population differences. They can also investigate Brazilian specialists' perceptions of local or regional green structures, potential improvements, and the perception of public managers on the theme.

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