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PUBLIC OPEN SPACES AND QUALITY OF LIFE: EVIDENCE FROM THE WHOQOL-BREF PROTOCOL [1]

ESPAÇOS LIVRES PÚBLICOS E QUALIDADE DE VIDA: EVIDÊNCIAS DO PROTOCOLO WHOQOL-BREF

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ABSTRACT

In the last decades, rapid urbanization has reduced urban green areas and public open spaces, influencing the health and quality of life of the population. This study analyses the influence of living nearby squares on the perception of quality of life. By using the WHOQOL-BREF Protocol, the quality of life of residents living within two radiuses from two squares located in different neighbourhoods in Brazil were compared. The results have been discussed based on the interviewees' characteristics and the Public Open Space physical attributes. The results indicated that living close to the urban squares can have positive impacts on quality of life.

KEYWORDS: Health. Questionnaire. Statistical analysis. Urban squares.

RESUMO

Nas últimas décadas, a rápida urbanização reduziu as áreas verdes urbanas e os Espaços Livres Públicos, influenciando na saúde e na qualidade de vida da população. Este estudo analisa a influência de morar próximo a praças na percepção da qualidade de vida. Utilizando o Protocolo WHOQOL-BREF, a qualidade de vida dos residentes que vivem em dois raios foi comparada em duas praças localizadas em diferentes bairros no Brasil. Os resultados foram discutidos com base nas características dos entrevistados e nos atributos físicos dos Espaços Livre Públicos. Os resultados indicaram que morar próximo às praças urbanas pode ter impactos positivos na qualidade de vida.

PALAVRAS-CHAVE: *Saúde. Análise estatística. Questionário. Praças urbanas.*

INTRODUCTION

IN THE LAST DECADES, rapid urbanization has directly interfered in the cities, resulting in the reduction of urban green spaces, and growing environmental problems (SALAZAR; RICHARD; DICLEMENTE, 2015). According to the United Nations Organization (2018), in 2018 all countries of Latin America and the Caribbean with more than 2 million inhabitants were more than 50% urban. Brazil's total population remained the largest in the region and it is estimated that 87% of the 211 million people in 2018 resided in urban settlements (UNITED NATIONS, 2018). In this context, in recent years there has been an increase in debates and studies on the relationship between the quality of life and the Public Open Space (POS) (CHAN, 2017; WAI; NITIVATTANANON; KIM, 2018; BENITA; BANSAL; TUNÇER, 2019; ZHANG *et al*., 2019). The Healthy City guidelines (WORLD HEALTH ORGANIZATION, c2022, *online*) define it as "[...] A healthy city is one that continually creates and improves its physical and social environments and expands the community resources that enable people to mutually support each other in performing all the functions of life and developing to their maximum potential". Thus, urban planning and design have a fundamental role in the promotion of good cities and the quality of life of the population.

In this regard, several studies have indicated the beneficial impacts of the use of POS in improving mental health (LIU *et al*., 2017a, 2017b; RUGEL *et al*., 2017; WARD THOMPSON *et al*., 2016) and in the reduction of chronic diseases like cardiovascular (COLOM *et al*., 2018) and obesity (CARROLL *et al*., 2020). Some studies also pointed out that the quality of the urban spaces is positively related to the quality of life of residents (JANSEN *et al*., 2017; BENITA; BANSAL; TUNÇER, 2019).

Several studies have identified different benefits that the use of POS provide to people's life. Kemperman and Timmermans (2014) indicated that green spaces in the urban environment can provide a meeting point and support social contacts. Such spaces are also related to less sedentary behaviour, as they encourage the practice of physical (CLELAND *et al*., 2019; CRANNEY *et al*., 2016; FLORINDO *et al*., 2017; HOFFIMANN; BARROS; RIBEIRO, 2017; JANSEN *et al*., 2017; PHAM *et al*., 2019; SILVA *et al*., 2018; VAN HECKE *et al*., 2018; VEITCH *et al*., 2019) and recreational activities (GILES-CORTI *et al*., 2013). Other positive effects of using the POS are the contact with nature (CHAN, 2017; EKKEL; DE VRIES, 2017; HOFFIMANN; BARROS; RIBEIRO, 2017), the construction of social identity among young people (PHAM *et al*., 2019), the noise reduction (DZHAMBOV; DIMITROVA, 2015) and the promotion of a sense of security (VAN HECKE *et al*., 2018).

However, the impact of the use of urban spaces on the perception of the quality of life is still a little explored topic in comparison to studies dealing with chronic diseases (CARROLL *et al*., 2020; WAN; SHEN; CHOI, 2020; XIE *et al*.,

2018) and general health habits (HOOPER *et al*., 2020; MORAN *et al*., 2020; TU *et al*., 2020). In addition, studies are often related to public parks (YUEN *et al*., 2019; ZHANG *et al*., 2019) and green areas (AMBREY, 2016; CHAN, 2017), although smaller POS, such as urban squares, are frequently better distributed in the urban environment, being more accessible to the population. Furthermore, studies are still inconclusive in indicating to what extent the distance from the POS to the house influences people's quality of life. Thus, this study aims to statistically analyse the influence of living nearby squares on the resident's perception of their quality of life. For this, this study was carried out with close residents of two squares located in different neighbourhoods of Juiz de Fora (Brazil). The World Health Organization Quality of Life (WHOQOL-BREF) protocol, which assesses the individual's perception of quality of life, has been applied to citizens living within two radiuses from each square: one up to 500m and another between 500 to 1000m. The data were statistically evaluated, and the results have been discussed based on the interviewees' characteristics — such as gender, age, income and educational level —, and the POS physical attributes.

STUDIES ON THE POS USAGE AND PEOPLE'S QUALITY OF LIFE

The proximity of people's homes to the POS may interfere with their daily activities and, consequently, their quality of life (WAI; NITIVATTANANON; KIM, 2018). The European Environment Agency (EEA) recommends that residents should have access to green spaces within a 15-minute walk of their residence (STANNERS; BOURDEAU, 1995), while Lynch (2007) adds that travel times below 20 minutes are unquestionably good to access the POS. Easy and safe access to open spaces seems to be especially important for the quality of social life of the elderly (ZHANG *et al*., 2019), for the feeling of happiness among young people (BENITA; BANSAL; TUNÇER, 2019) and to stimulate physical activity among children (ALMANZA *et al*., 2012).

Through the application of questionnaires, Lu *et al*. (2018) assessed the time spent by 999 students on computers in China. The study concluded that, among other factors such as socio-cultural systems and economic levels, students with access to other recreational and leisure activities in the neighbourhood spend less time on the Internet and, consequently, have fewer depressive symptoms. The application of questionnaires was also the method used by Nasution and Zarah (2014) applied to 384 practitioners of physical activities in four POS in Indonesia. The study indicated that 86% of the respondents believe that open spaces positively affect their physical and psychological health.

The type of activity performed in the POS is related not only to the age of the neighbourhood residents but also to the typology and dimensions of such spaces. Extensive POS (greater than 7ha) is associated with vigorous activities such as walking, running and cycling (JANSEN *et al*., 2017). On the other hand, while linear parks are mostly used for intense physical activities, natural parks are

associated with their environmental benefits and community parks are related to the advantages of social interaction (BROWN; RHODES; DADE, 2018). According to Sugiyama *et al*. (2014), the presence of POS alone may not be enough to facilitate the physical activities of the residents and may require certain urban equipment for this purpose. According to Hills, Farpour-Lambert and Byrne (2019), quantitative evidence confirmed a positive association between the presence of trails, playgrounds and specific types of sports fields with public visitation in open spaces. Another urban feature indicated by Sugyama *et al*. (2014) and Veitch *et al*. (2019) was the presence of areas for dogs.

By using the WHOQOL-BREF Protocol, Zhang *et al*. (2019) evaluated the effects of the physical attributes of urban parks and green spaces on the quality of life of an elderly community in Hong Kong. The tool was applied to a sample of 909 residents of areas within a 400 to 800m radius of the parks. They found out that neighbourhoods of medium to high density, well-ordered and with trees can significantly contribute to the people's social and environmental quality of life and appear to be particularly important for those who live alone. Using the same tool, the study carried out by Yuen *et al*. (2019) sought to understand how green spaces and the accessibility of POS in compact urban areas affect the physical activity and healthy eating habits of residents in China. Along with the IPAQ[2] tool, data were collected from 554 participants living in an area within 500m of the parks. Results indicated that older residents usually use parks and sidewalks while sports facilities are preferable among younger people. Thus, the promotion of physical exercise and health can be achieved through urban designs that include POS accessible to different aging groups.

Through the application of questionnaires based on new informational technologies, such as Twitter and Flickr, Brindley *et al*. (2019) indicated to what extent health levels were associated with the quality of green spaces in England. The study included 345 people and was carried out in 850 green areas. The authors concluded that the lack of cleanliness in such spaces produces feelings of discomfort and insecurity, discouraging their use and inhibiting their benefits related to the promotion of well-being. Additionally, in order to identify the importance of green spaces by users, Ives *et al*. (2017) evaluated 323 green areas from the application of the PPGIS[3] tool and interviews with 418 Australian participants. The results indicated that the POS has positive values such as aesthetics, social interaction, and cultural significance and negative aspects, such as noise and danger, that influence the quality of life of users.

Differently, Bahrini, Bell and Mokhtarzadeh (2017) used spatial syntax as a method for analysing the location, quality and quantity of POS in the urban spaces in Tehran, Iran. Based on the evaluation of 16 spaces, the study indicated that the availability of parks does not follow the population's sociodemographic character. The authors identified the presence of large forest parks and non-recreational land in mountainous and cold areas and parks located in the city centre with low levels of maintenance. Thus, they

concluded that the use of such spaces is limited, giving a false image of the POS availability to the population.

Most of the studies that investigate the influence of POS on people's quality of life were carried out in developed countries (COMSTOCK *et al.*, 2010; KEMPERMAN; TIMMERMANS, 2014). However, with few exceptions (GÓMEZ *et al.*, 2005; HALLAL *et al.*, 2010) Latin America is still a little studied region, although it has great vulnerability due to its level of urbanization and high social inequalities between and within cities (VEREINTE, 2013), a deficit and uneven distribution of urban green space (RIGOLON *et al.*, 2018) and high crime rates (SREETHERAN; VAN DEN BOSCH, 2014). In addition, several types and dimensions of POS have been studied in researches that address the perception of quality of life. However, studies that have considered urban squares are still uncommon. Those spaces have a strong presence in Brazilian cities and due to their small size, in comparison to parks, they are well distributed in the urban environment, being spaces with a greater impact on people's daily lives. Besides that, most current studies have focused on the connections between POS usage and chronic diseases or general health habits. Thus, there are still few studies that assessed the influence of living nearby the POS on people's perception of quality of life. Although questionnaires have been used in several related studies, the WHOQOL protocol, commonly used in the health-related research field, has been little explored in studies that consider urban planning for health promotion.

METHODOLOGICAL PROCEDURES

In this study, the perception of the quality of life of residents living close to two squares in the city of Juiz de Fora, Brazil, was assessed through the application of the WHOQOL-BREF protocol. The sample included residents living within two different radiuses from the centre of the squares: up to 500m and between 500 to 1000m. The results were evaluated and contrasted with the physical attributes of each POS. This item presents the WHOQOL protocol, the selection and characterization criteria of the urban squares analysed, the definition of the radiuses considered, the number of respondents and the applied statistical analyses.

THE WHOQOL PROTOCOL

In 1993, the World Health Organization (WHO) defined an international instrument called WHOQOL (World Health Organization Quality of Life) to compare the quality of life between cultures. It assesses the individual's perceptions in the context of their culture and value systems, goals, patterns, and personal concerns. The instrument has been extensively field tested. The purpose of the tool is to determine the individual's perception of quality of life from the following initial question: "How do you feel about your quality of life, health and other areas?" (WORLD HEALTH ORGANIZATION, 1996).

The WHOQOL-100 consists of an assessment based on 100 questions that produce a multidimensional profile of scores between domains and subdomains (facets) that define the quality of life. An abbreviated version, the WHOQOL-bref, has therefore been developed to provide a short assessment that looks at the domain level profiles (WORLD HEALTH ORGANIZATION, 1996). WHOQOL-100 and WHOQOL-BREF have many uses, including use in medical practice, research, auditing, policy making, and assessment of the effectiveness and merits of different treatments. They can also be used to assess variation in the quality of life across different cultures, compare subgroups within the same culture, and measure change over time in response to changing circumstances in life (WORLD HEALTH ORGANIZATION, 1998). WHOQOL is, therefore, an assessment of a multidimensional concept that incorporates the individual's perception of health status, psychosocial status, and other aspects of life.

The WHOQOL-BREF consists of 26 questions, in which questions 1 and 2 deal with personal assessment in relation to the quality of life and health based on the following questions: "How do you assess your quality of life?" and "How satisfied are you with your health?". In addition, the questionnaire has another 24 questions that are divided into four categories of domains: Physical, Psychological, Social Relations and Environment. The questions included in the different domains are presented *in Table 1*. The table also presents the order of the questions asked according to the protocol's recommendations.

TABLE 1 – Physical attributes of the urban squares analysed.

Attributes	**1** **Poeta Daltemar Lima Square** **(Bom Pastor Neighbourhood)**	**2** **Jarbas de Lery Square** **(São Mateus Neighbourhood)**
Area	11.273,89 m²	4.938,90 m²
Population density of the immediate neighbourhood	2	145,98
Neighbourhood average income	R$ 4,131.00	R$ 2,680.00
Percentage of green area in relation to the total square area	60%	30%
Playground	✓	✓
Gym equipment	✓	–
Soccer court	–	✓
Area for dogs	✓	✓
Hiking trail	✓	–
Food or similar kiosks	✓	–
Benches (linear meter)	54m (0,005m'/m²)	46m (0,009m'/m²)
Area of landscape treatment*	20%	80%
Signs of abandonment	–	–
Presence of homeless People	–	✓
Number of roads around	3	3
Square shape	Rectangle	Triangle

* Artistic creation with natural elements in order to promote the integration of man with nature in an aesthetic and functional way.

Source: Elaborated by the author (2021).

The protocol uses the Likert scale from 1 to 5 points, in which: (1) means very dissatisfied and (5) is used for very satisfied. Questions 3, 4 and 26 are reversed, that is, 1 has a positive perception and 5 has a negative perception. Results are given per domain and per question using arithmetic mean for each data set. The final result is given by indicators related to the quality of life, in which results from 1 to 2.9 indicate that it needs to improve; between 3 and 3.9 indicate regular; from 4 to 4.9 is good and values equal to 5, represent very good. Domain scores for the WHOQOL-BREF are calculated by taking the mean of all items included in each domain and multiplying by a factor of four, then all domains are added together to obtain a final score. These scores are then transformed to a 0-100 scale for comparison with WHOQOL 100.

URBAN SQUARES SELECTION AND CHARACTERIZATION

This study was conducted in Juiz de Fora, which is a Brazilian medium size city located in the southeast of the state of Minas Gerais. The city is 1436 km², with a population of approximately 500,000 inhabitants. For this study, two squares placed in neighbourhoods close to the central area of the city were selected: (1) Poeta Daltemar Lima Square, located in Bom Pastor neighbourhood and (2) Jarbas de Lery Square located in São Mateus neighbourhood (*Figure 1*).

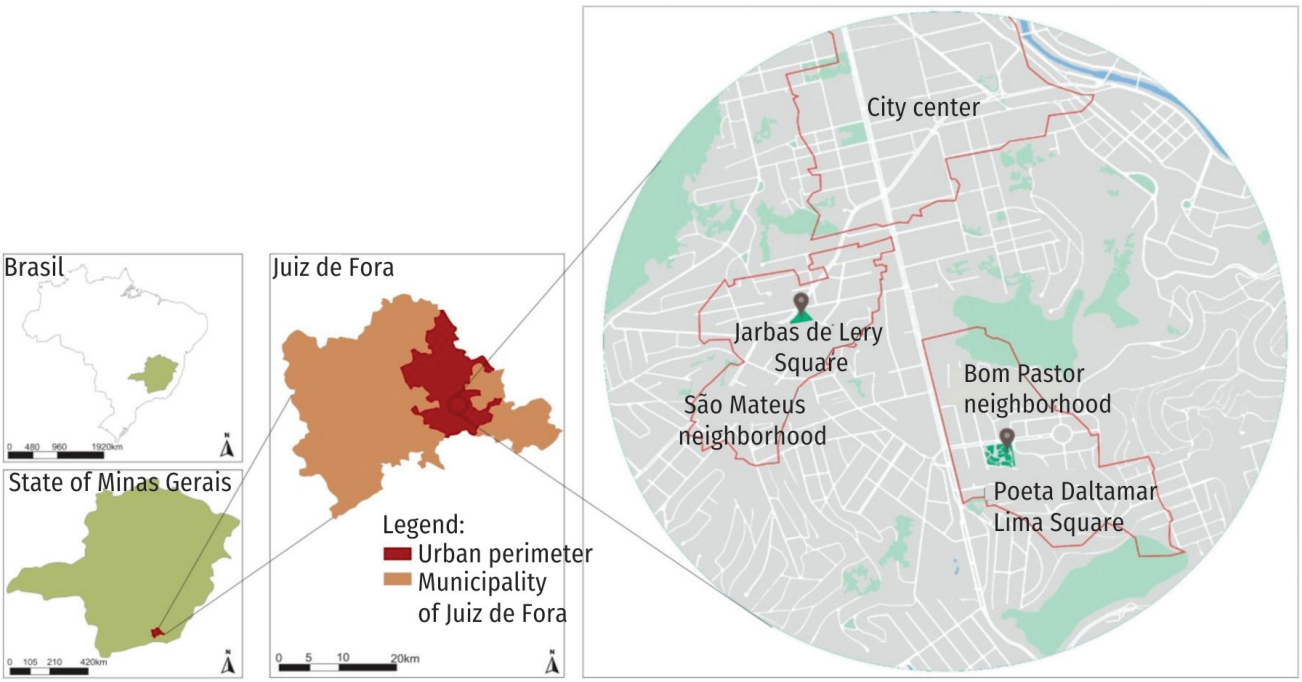

FIGURE 1 – City of Juiz de Fora localization and Location of squares in relation to the central area.

Source: Elaborated by the authors (2021).

The squares are easily accessible and located in neighbourhoods with similar income that ranges from medium to high, according to the Brazilian Institute of Geography and Statistics (IBGE, 2010). In addition, they are located within city blocks, surrounded by public roads. On the other hand, despite

having a similar number of activity areas, they present different dimensions, types of activity areas, percentage of green area and landscape treatment, as can be seen in *Table 1*. It includes the neighbourhoods and the urban squares' physical characteristics (SENRA, 2019).

Bom Pastor neighbourhood, where square 1 is located, has a population of 7,772 inhabitants, which corresponds to 1.3% of the total number of the city, and 2,768 households. In this neighbourhood, 20.4% of the population is elderly (INSTITUTO BRASILEIRO DE GEOGRAFIA E ESTATÍSTICA, 2010) and residential use is predominant, although the area is close to a region that offers trade and services. Square 1 contains different activity areas for children, adults, and the elderly, with the presence of a playground, walking trail and gym equipment. In addition, it is located relatively close to the city centre (approximately 2.3km) and has a public transport stop (*Figure 2*).

FIGURE 2 – Photos and boundary of radiuses 500 to 1000m of Square 1 – Poeta Daltemar Lima.
Source: Elaborated by the authors (2021).

São Mateus neighbourhood, which contains square 2, is relatively close to the city centre (approximately 1.7 km) and is characterized by a wide variety of shops. The neighbourhood contains a population of 19,582 inhabitants, which corresponds to 3.8% of the city and 9,425 households (IBGE, 2010). Around 20% of the population is elderly. Square 2 has an area reserved for dogs and a playground, in addition to an open court, generally used by young people. The square is bypassed by one of the main avenues of the city, Presidente Itamar Franco Avenue, and is easily accessible by the public transport network. The square has frequent cultural events that encourage local commerce, such as craft fairs on weekends (*Figure 3*).

FIGURE 3 – Photos and boundary of radiuses 500 to 1000m away from Square 1 – Jarbas de Lery.
Source: Elaborated by the author (2021).

DATA COLLECTION AND ANALYSIS

The radiuses that included the areas selected for the application of the WHOQOL-BREF Protocol were determined from the walking distance between the POS and the most distant residence. The first radius comprises residents living up to 500m from the squares, who walk between 5 and 15 minutes to access them and the second includes residents between 500m and 1,000m from the squares, who walk between 15 to 20 minutes to access them. In each buffer zone considered and, in each square evaluated, groups of 30 people were interviewed, totaling a sample of 120 citizens.

The official Portuguese-translated WHOQOL-BREF Protocol was created on "Google Forms" to facilitate its application to the interviewees, who were approached on the roads around the squares. In addition to the questions already determined by the Protocol, questions about the characteristics of the respondents such as age, gender, income and educational levels were added. The questionnaires were applied in approximately eight days in each square in the morning and afternoon, during the months of August, September, and October of 2019. The collected data were tabulated using Microsoft Excel, version 2016 (Microsoft, Redmond, USA) and treated in the Statistica Software, version 8.0 (Tibco, Palo Alto, USA).

For the application of the statistical tests, scores considered in each domain correspond to the final values, with the results already multiplied by 4, as indicated in the Protocol guidelines (WHO, 1998). All statistical tests were performed with a significance level of 5% (α = 0.05). The aim and the tests applied are the following:

1) Adherence test using the Kolmogorov-Smirnov (KS) test. This analysis indicated that the p values were lower than the level of significance ($p < 0.05$), indicating that the data did not follow a normal distribution. This result supported the selection of non-parametric tests for the subsequent statistical analysis.

2) Tests of hypotheses for simple comparisons between independent groups using the Mann-Whitney test (MW). These tests had two objectives: the first was to compare the Protocol results between the two buffer zones considered (500m vs. 1000m), and the second was to compare the Protocol results between the squares (Square 1 vs. Square 2).

3) Multiple comparison tests, using Kruskal Wallis test. This assessment evaluated the Protocol results according to the characteristics of gender and age of the interviewees.

4) Spearman test. This test aimed to correlate the Protocol results to the interviewees' income level in the different buffers zones and squares.

RESULTS AND DISCUSSION

This item presents the results of the statistical tests in each buffer zone and square evaluated. It includes the general results of the WHOQOL-BREF protocol

and the findings by domain. The implications of these results are discussed in light of the attributes present in each POS.

SAMPLE CHARACTERISTICS AND FREQUENCY OF USE OF THE SQUARES

Table 3 summarizes the characteristics of the sample collected, which comprised 60 participants per square. Both samples included the majority of the interviewees with an income of up to 6,000 reais (Brazilian currency). However, Square 1 concentrates the largest number of interviewees with an income above 10,000 reais (30% at 500m and 20% at 1000m). About 80% of the total respondents are adults (between 18 and 59 years old), while the rest are elderly (60 years old or more) and, on average, 60% of them are women. *Table 2* also presents the averages obtained from the scores given to the different domains of the WHOQOL-BREF.

Regarding the frequency of use of the square by the interviewees, around 54% of the participants who live in the closest buffer zone of Square 1, visit it between one and seven days of the week; among the most distant residents, this value drops to approximately 16%, as shown in *Table 3*. On the other hand, in Square 2 these values reach 37% and 33% among the residents of the closest and the further buffer zones, respectively.

Regarding all interviewees, the Protocol results from those that visit the squares from one to seven times a week showed a better quality of life than those that do not go any day of the week. Among the residents close to Square 1, the users with the highest level of quality of life are those who go between four and five days a week. In Square 2, on the other hand, the enhanced score on the quality of life resulted from those who visit it between two and three times a week.

When analyzing the results per radius, in Square 1 although there was no clear trend between the quality of life and the POS usage frequency among the closest residents, a better quality of life was positively related to the frequency of visits to the square among those interviewees living further. In Square 2, on the other hand, there was also no clear trend in the two buffer zones. But when analyzing the results from the most distant residents that use the square up to three times a week, an improvement in the quality of life was noticed.

TABLE 2 – Sample characteristics and results of the Protocol by domain. 1 of 2

	Square 1 500m	Square 1 1000m	Square 2 500m	Square 2 1000m
Adults	83%	77%	83%	86%
Elderly	17%	23%	17%	14%
Women	57%	63%	63%	70%
Men	43%	37%	37%	30%

TABLE 2 – Sample characteristics and results of the Protocol by domain. 2 of 2

	Square 1 500m	Square 1 1000m	Square 2 500m	Square 2 1000m
Income				
Up to R$3k	27%	17%	30%	23%
Up to R$6k	33%	43%	34%	36%
Up to R$10k	7%	13%	34%	14%
More than R$10k	30%	17%	2%	20%
Not informed	3%	10%	0%	7%
Educational Level				
Elementary School	0	1	3	1
High school	13	14	12	13
University education	15	14	11	10
Postgraduate studies	2	1	4	6
WHOQOL Results				
Physical Domain	17,01	15,56	15,34	15,41
Psychological Domain	16,08	15,87	14,68	15,09
Environmental Domain	16,53	14,80	14,62	14,71
Social Relations Domain	16,49	15,26	14,74	15,80
Self-perception	16,40	16,46	14,68	15,80

Source: Elaborated by the author (2021).

TABLE 3 – Frequency of use of the square.

Frequency	Square 1 500m (%)	Square 1 1000m (%)	Square 2 500m (%)	Square 2 1000m (%)
None	47	83	63.33	67.67
One day per week	17	13	20	23.33
Two or three days per week	17	0	0	3.33
Four or five days per week	10	3	0	0
Six or seven days per week	10	0	16.67	6.67

Source: Elaborated by the author (2021).

GENERAL RESULTS OF WHOQOL-BREF

Figure 4 presents the variability of the data regarding the results of the Protocol for each of the buffer zones evaluated. The findings indicate that the quality of life was significantly higher among the residents living close to Square 1 than the other participants. These results reveal a positive association between living close to the POS and the quality of life of residents, as shown in other related research in Singapore (BENITA; BANSAL; TUNÇER, 2019), Japan (ZHANG *et al.*, 2019), United Kingdom (BRINDLEY *et al.*, 2019) and Thailand (ALDERTON *et al.*, 2019), for example.

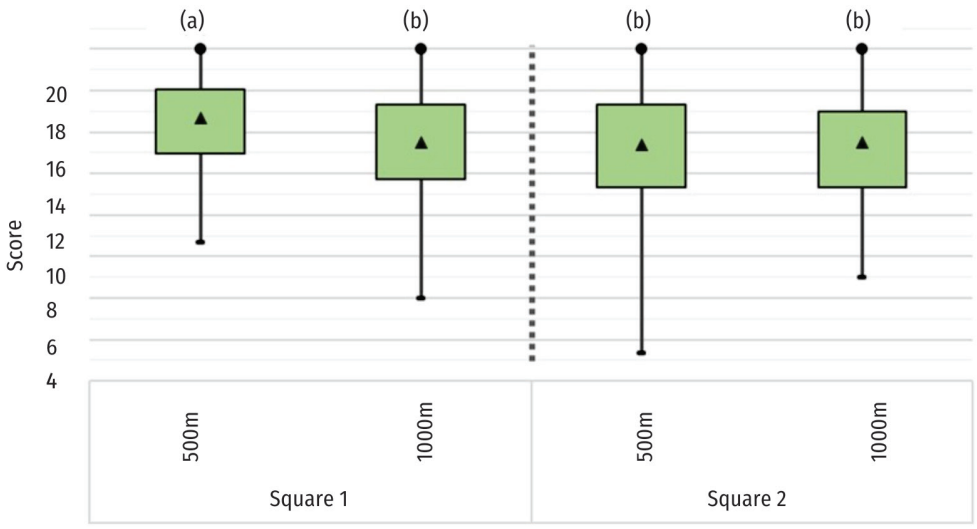

FIGURE 4 – Box Plot graph with general results of the WHOQOL-BREF according to the buffer zones evaluated in both squares.

Notes: *In the graph, medians sharing the same letter showed no significant differences between them.

Source: Elaborated by the author (2021).

However, in Square 2, there was no significant difference between the results obtained from the residents of both buffer zones. Although the two squares have equipment that encourages the practice of physical and recreational activities, Square 1 has a larger area, is in a neighbourhood with a lower population density and has a higher percentage of green area. Some studies confirmed that the presence of green areas near people's homes is related to fewer psychological problems (CHERRIE *et al.*, 2018; LU *et al.*, 2018; RUGEL *et al.*, 2017; VEITCH, 2019). Zhang *et al.* (2019) indicated that medium to high density and well-ordered neighbourhoods, mixed with green areas, can significantly contribute to people's social and environmental quality of life. Therefore, the attributes observed in Square 1 have already been observed as motivators for the use of the POS, thus being able to influence people's quality of life.

RESULTS OF WHOQOL-BREF BY DOMAIN

In more detail, *Figure 5* presents the distribution of the scores calculated for each domain of the Protocol on the different buffer zones in each square. The results indicated that the Physical Domain of Square 1 received a significantly higher value (17.0), indicating that those respondents better assessed their physical health. A reason for this can be the presence of physical activity equipment and a walking trail in Square 1, absent areas in Square 2. According to Cranney *et al.* (2016), the outdoor gym may provide park users with more opportunities for active recreation, along with social interactions.

On the other hand, the score given to the Environmental Domain of Square 2 was significantly lower than the other domains (14.6), meaning that those interviewed weakly evaluated the aspects related to the environment in which they live. This can be related to the poorest environmental conditions of the space, as it comprises a smaller POS with relatively reduced green area and is placed in a higher density neighbourhood, aspects already observed

by Bahrini, Bell and Mokhtarzadeh (2017) as restraints for POS usage. Additionally, people living in the closest buffer zone of Square 1 indicated a numerically higher score for the domain related to social relations than the other interviewees.

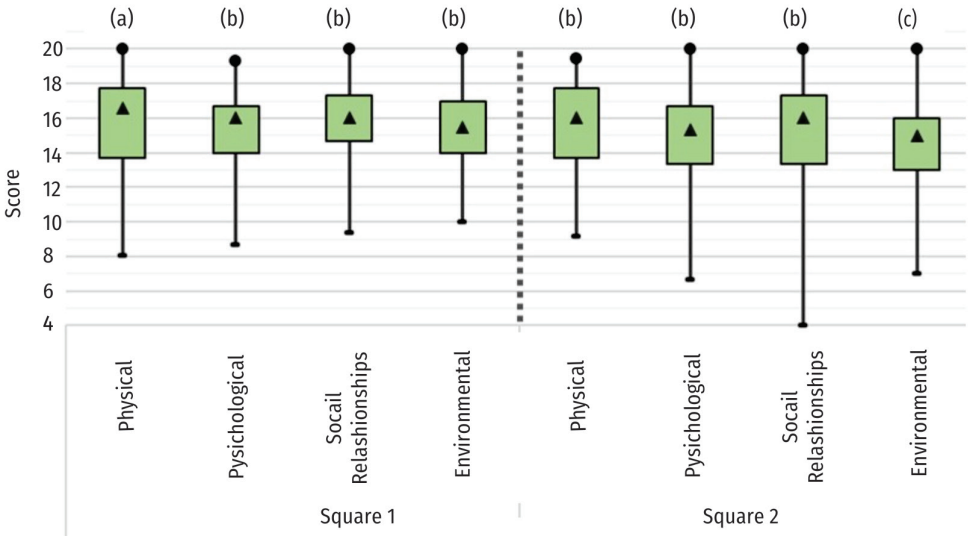

FIGURE 5 – Box plot graph with data distribution of results of the WHOQOL-BREF domains per square

Source: Elaborated by the author (2021).

SPECIFICS QUESTIONS OF WHOQOL RELATED TO THE SQUARE'S ATTRIBUTES

Some specific questions of the WHOQOL-BREF protocol were analysed in detail in order to identify the physical attributes of the environment that influence the use of the squares. *Table 4* presents the average score given by the participants for questions 9, 14 and 8 in each square and buffer zone considered. The results related to question 9, which deals with an analysis of the respondent's satisfaction with the physical environment in relation to climate, noise, pollution, and local attractions, showed similarities with the general result of the Protocol. While the residents closest to Square 1 evaluated these issues better, in Square 2 the results were reversed. Likewise, the score given to question 14, which deals with the interviewee's leisure activity opportunities, was higher among residents closer to the squares than among those living further away. It is possible that residents closest to the squares have them as a reference point for leisure activities, as already noted by Dias *et al*. (2019). Regarding the question about the feeling of security (Question 8), the average score given by the residents of Square 1 was higher than that of Square 2. This can be explained by the presence of homeless people in the latter. Those safety issues have already been mentioned by Zhang *et al*. (2019) and Tandogan and Ilhan (2016) as important attributes for the quality and usage of the POS.

TABLE 4 – Specific Questions of WHOQOL.

WHOQOL Questions	Scores			
	Square 1		Square 2	
	500m	1000m	500m	1000m
Question 14 – To what extent do you have opportunities for leisure activity?	15.87	14.13	14.27	14.00
Question 9 – How healthy is your physical environment (climate, noise, pollution, attractions)?	13.20	14.13	14.27	13.60
Question 8 – How safe do you feel in your daily lifeq?	15.07	14.80	14.00	14.27

Source: Elaborated by the author (2021).

QUALITY OF LIFE ACCORDING TO THE INTERVIEWEE'S CHARACTERISTICS

Although the tests performed for gender, age and educational level did not show significant differences between the quality of life of the sample groups, the Tests of Spearman for income level indicated that there is a direct relationship between residents closest to the squares to have higher income, as can been seen in *Table 5*. This can also influence the greater results of quality of life among those living close to the POS.

TABLE 5 – Percentage of income range and average of WHOQOL's overall result.

	Square 1 – 500m		Square 1 – 1000m		Square 2 – 500m		Square 2 – 1000m	
	% of people	WHOQOL result	% of people	WHOQOL result	% of people	WHOQOL result	% of people	WHOQOL result
Not informed	**3.33**	15.23	**10.00**	15.49	**3.33**	13.85	**9.68**	15.59
Up to R$ 3k	**26.67**	15.27	**16.67**	13.51	**33.33**	14.22	**19.35**	15.79
Up to R$ 6k	**33.33**	17.20	**43.33**	16.40	**30.00**	14.56	**41.94**	14.92
Up to R$ 10k	**6.67**	16.54	**13.33**	16.38	**26.67**	15.60	**9.68**	14.67
More than R$ 10k	**30.00**	16.91	**16.67**	14.15	**6.67**	18.00	**19.35**	15.05

Source: Elaborated by the author (2021).

FINAL CONSIDERATIONS

This study aimed to statistically analyse the influence of living nearby Public Open Spaces (POS) on the resident's perception of the quality of life. With a sample of 120 citizens of Juiz de Fora, Brazil, this study compared the results of residents living within areas limited by two radiuses from the squares: one up to 500m and another between 500 to 1000m. Two squares located in different neighbourhoods and with particular physical attributes were evaluated via the application of the WHOQOL-BREF Protocol.

The results indicated that living close to the urban squares can be positive for people's quality of life. This association was clearly identified on the most used square, which is also the one with a larger area and attractive attributes that enhance the practice of physical activities, such as walking trails and fitness equipment. Thus, a POS's physical attributes are as important to people's quality of life as living close to them. The results also indicated that the quality of life may be also influenced by their frequency of usage. On the other hand, it is important to mention that the quality of life seems to be also influenced by other factors, such as income level and neighbourhood density.

Urban squares are smaller and are spread out in the city, and therefore are more accessible to people, which may have a great influence on their quality of life. The findings from this research indicate, however, that as they have a lower area than the parks, it is a real challenge to design such spaces with attractive physical attributes for the different aging groups. In this study, the following attributes were observed as important characteristics to increase people's quality of life: size, green area, diverse equipment for physical activity, and security.

Finally, it is worth mentioning that the use of the WHOQOL Protocol for urban research was feasible, and innovative in Brazil, although complementary questions were necessary to allow correlations between the quality of life and the interviewees' characteristics. In this study, the number of people interviewed and the spaces studied are limitations that should be further addressed. These findings are relevant to urban planning specialists and public authorities as it supports the drawing of guidelines for urban design. Additionally, practitioners may use them to identify constraints, weaknesses and potential solutions to urban planning development initiatives and projects in developing countries.

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NOTES

1. Article elaborated from dissertation by E. B. BERALDO, entitled "*Avaliação da Qualidade de Vida e os Espaços Livres Públicos de Juiz de Fora, MG*". Universidade Federal de Juiz de Fora, 2021. Support: Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (Processo nº 88887.501552/2020-00)
2. Developed by the World Health Organization (WHO), the United States Center for Disease Control and Prevention (CDC) and the Karolinska Institute in Sweden, the IPAQ is a questionnaire that allows the estimation of weekly time spent on moderate and vigorous physical activity, in different everyday contexts.
3. The tool consists of a participatory mapping method used as a social research tool to assess the multiple benefits of urban parks and greenspaces.

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