

How urban green areas influence different dimensions of sustainable behaviour

Como as áreas verdes urbanas influenciam diferentes dimensões do comportamento sustentável

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ABSTRACT

Purpose: The alternative of sustainable consumption is proposed to change the excessive demand and production that aggravate environmental problems. However, translating ecosystems concerns into sustainable attitudes is a well-known challenge. This study analyzes the hypothesis of a positive correlation between how often people visit urban green areas and their perception of sustainable consumption

Design/methodology/approach: Based on the nonparametric item response theory (NIRT) and logistic regression models.

Findings: The hypothesis was partially confirmed.

Implications: The importance of urban green areas and their potential to encourage sustainable consumption reinforces the need for governments to develop environmental education programs that include incentives to visit public parks and emphasize the reduction of environmental degradation.

Originality/value: This research contributes (i) to present the importance of urban green areas to change the individuals' behavior toward sustainable consumption and (ii) to test how urban green areas influence different dimensions of sustainable behavior.

Keywords: Green areas; Sustainable consumption; Pro-environmental behavior

RESUMO

Objetivo: A alternativa de consumo sustentável é proposta para mudar a demanda e a produção excessiva que agravam os problemas ambientais. No entanto, traduzir preocupações ecossistêmicas em atitudes sustentáveis é um desafio bem conhecido. Este estudo analisa a hipótese de uma correlação

positiva entre a frequência com que as pessoas visitam áreas verdes urbanas e sua percepção de consumo sustentável.

Metodologia: Baseado na teoria de resposta ao item não paramétrica (NIRT) e modelos de regressão logística.

Resultados: A hipótese foi parcialmente confirmada.

Implicações: A importância das áreas verdes urbanas e seu potencial para estimular o consumo sustentável reforça a necessidade dos governos desenvolverem programas de educação ambiental que incluam incentivos à visitação de parques públicos e enfatizem a redução da degradação ambiental.

Originalidade: Esta pesquisa contribui (i) para apresentar a importância das áreas verdes urbanas para mudar o comportamento dos indivíduos em relação ao consumo sustentável e (ii) testar como as áreas verdes urbanas influenciam diferentes dimensões do comportamento sustentável.

Palavras-chave Áreas verdes; Consumo sustentável; Comportamento pró-ambiental

1 INTRODUCTION

Population growth and high consumption are determining factors for increasing waste production. Both the quantity and the type of waste produced have had negative consequences for the environment. Also, changes due to industrialization with the intensification of production accelerate environmental degradation, significantly compromising the natural resources available (Arslan et al., 2012; Figueroa-García et al., 2018; Gore, 2006; Kalamas et al., 2014). The current high levels of consumption and production of disposable goods aggravate the environmental situation, which has led to many studies stressing the issue and suggesting possible solutions (Norway, 1995; United Nations, 2012, 2016, 1992).

Although consumers can control and perceive their actions, they are also impulsive, and their behaviors are induced by values and society. Thus, studies seek to understand how consumer behavior can be influenced to promote sustainable consumption patterns (Figueroa-García et al., 2018; Kalamas et al., 2014; Sunkel, 2011).

People contribute to environmental degradation directly by excessive consumption and indirectly by demanding products and services and influencing other actors. The influence of the individuals' behaviors on the environment is an issue that requires further studies to point out directions to reduce the impact of consumption, exploring strategies such as environmental education and the use of urban green areas to promote environmental awareness (Abdullah & Keshminder, 2020; dos Reis et al., 2020; Martins, 2010).

Consumer behavior can be measured, offering subsidies to elaborate and test hypotheses and create initiatives to improve such behavior. It is related to socio-demographic characteristics, education, and information, which influence people's attitudes and habits. The 3Rs approach (refuse, reduce, recycle) is a form of measurement that indicates production and/or consumption practices seeking to improve the efficiency of the use of materials (Figueroa-García et al., 2018; Friedman, 2009; Holden, 2004; Jaca et al., 2018; Kalamas et al., 2014; Tripathi & Singh, 2016).

The main objective of this paper is to assess the relationship between visits to a park and a greater willingness to practice sustainable consumption. It is investigated in this context of a survey the responses from 134 interviewees who had visited an urban green area located in the State of São Paulo, Brazil. This ecological park occupy 52,800 m² and counting on an environmental education center, and offering facilities and attractions such as a sports court, outdoor gym equipment, a playground, and a hiking trail.

Visits to urban green areas offer the opportunity to satisfy non-materialistic needs, more visits can be used as a proxy for nature contact, some recent literature points out that greater contact with nature can be positively related to sustainable consumption (Ghisellini et al., 2016; Kothari et al., 2014; Martins, 2010; Spaargaren, 2003). In this respect, our hypothesis is that more visits to urban green areas are positively related to sustainable consumption.

The task of engaging people in behavioral changes to protect the environment is facilitated when understanding the most relevant factors influencing consumption (Abdullah & Keshminder, 2020; Forum, 2014; Tripathi & Singh, 2016). Therefore, green areas can be important tools for the promotion of better quality of life and the reduction of environmental degradation, policies could be developed based on the promotion and maintenance of public parks, also offering environmental education within these parks aiming to strengthen sustainable consumption habits.

This study responds to the acceleration of environmental problems due to the individuals' behaviors, presenting a hypothesis related to the importance of urban green areas and their potential to encourage sustainable consumption. The intention is to offer some guidance in the challenge of reducing environmental degradation. Through this initial background, this research offers two contributions. First is to present the importance of urban green areas to change the individuals' behavior toward sustainable consumption. The second contribution is testing how urban green areas influence different dimensions of sustainable behavior.

The rest of the paper presents, in order, the sections: Sustainable Consumption, where environmentally conscious consumption is briefly classified, ways to measure sustainable consumption, and the role of urban green areas in sustainable consumption are presented to ground the hypothesis of this paper; this section is followed by the Methodology where the target public and data-collecting instrument as well as the data analysis strategy are presented; then, the results are displayed, the dimensions for sustainable consumption are defined, the profile of the respondents is evaluated and the relation between consumption profile and visits to the park is demonstrated; finally, the final considerations are made.

2 SUSTAINABLE CONSUMPTION

Sustainable consumption encompasses the assumptions of sustainable development (World Commission on Environment and Development, 1987), understood as satisfying present needs without compromising the ability of future generations to meet their own necessities (Belz & Peattie, 2012; Luchs & Mooradian, 2012; Norway, 1995; Tripathi & Singh, 2016). Although the topic is relevant and already discussed in many of its dimensions, there is room for further studies.

From a behavioral perspective, the consumer of products that cause less or no harm to the environment is considered a green or ecologically conscious consumer. These consumers intentionally behave to produce a null or favorable

effect on the environment and society as a whole (Calisto Friant et al., 2020; Gonçalves et al., 2022; Jacqueline, 1994; Lages & Neto, 2002; Reike et al., 2018).

In this sense, sustainable consumption behavior seeks to reduce consumption, disposal, and pollution (Arslan et al., 2012; Hini et al., 1995). It involves changes in citizens' attitudes, contributing to a new understanding of the social and cultural context (Afonso & Liège, 2012). Pinheiro et al. (2014) states that it is possible to identify factors that influence consumer behavior, considering individual, psychological, sociocultural, situational, and demographic characteristics. According to Lindstrom (2017), there is a logic of consumption where subconscious thoughts, feelings, and desires drive consumer purchase decisions.

2.1 Dimensions of Sustainable Consumption

Behavior is related to a wide range of factors that can influence people's attitudes and habits. In general, socio-demographic characteristics such as gender, age, and income are related to different consumption habits. Other factors associated with education and information, awareness, materialism and collectivism, environmental responsibility, normative responsibility and behavior, and environmental sensitivity, also proved to be relevant for sustainable consumption (Al-nuaimi & Al-Ghamdi, 2022; Figueroa-García et al., 2018; Ibiapina et al., 2020; Kim & Choi, 2005; Tripathi & Singh, 2016; Ualison et al., 2022; Wang et al., 2014).

Education can also be an important factor, Garcia et al. (2018) has stressed its importance. The author highlighted the environmental and social environmental education, which includes relationships with family, friends, and traditions influenced by market conditions, more directly, the price of products and, finally, governmental actions. according to Kim and Choi (2005), sustainable behaviors are related to environmental concerns. The perception of the environment and the intention to participate in solutions to environmental problems have proved relevant to engage in sustainable behaviors (Chan, 2001; Chan & Lau, 2000; Dunlap,

2002; Leary et al., 2014; Zhao et al., 2014). Studies have also examined the consumers' perception about their level of consumption and individual impact on the environment (Bhuiyan et al., 2014; Hines et al., 2010; Tripathi & Singh, 2016).

Environmental education includes relevant strategies such as the recognition of environmental problems and the intention to study solutions to address them through sustainable consumption. Therefore, environmental education has its roots in society's concerns about the future and the quality of life of present and future generations, reflecting on new ways for people to relate to the environment (Chan, 2001; da Cruz et al., 2020; Wang et al., 2014).

There are numerous opportunities to change consumption patterns based on sustainable models, mostly inspired by more socially-environmentally aware consumers. This change is important because consumer demand influences the way companies produce their products and services (Jaca et al., 2018; Kevin et al., 2021; Stanitsas et al., 2019). In this context, the approach Rs can represent a change in attitude toward consumption and waste generated in the production process.

The Rs consists of (i) reduce, which represents less consumption, advocating a high degree of awareness; (ii) reuse, offering different and creative uses for products already utilized, before discarding or recycling them; (iii) recycle, i.e., reinserting the product in the production process, replacing raw materials, completing its cycle when it returns to the market and, (iv) refuse, i.e., the consumer adopts a critical position, adjusting their standards and causing less harm to the environment (Reike et al., 2018).

In this way, it is possible to observe consumption as a cycle so that disposal becomes less frequent, efficiency in using natural resources is improved, and production and consumption are reduced. The Rs approach presents a hierarchy and levels, i.e., recycling is an alternative when it is no longer possible to reduce or reuse waste. In addition to these four concepts (reduce, reuse, recycle, and refuse), other Rs have been studied and can be considered as dimensions to assess the

level of sustainable consumption (Barbosa-Póvoa et al., 2018; Beiler et al., 2020; Calisto Friant et al., 2020; Reike et al., 2018; Schöggel et al., 2020).

2.2 The role of urban green areas in sustainable consumption

Contextual conditions, such as the price of sustainable products and the infrastructure that directly influences the consumer (buildings, parks, and policies), can encourage behavioral changes. Formative environmental experiences can foster attention to the environment, leading to behavioral changes toward sustainable consumption, increasing environmental sensitivity, i.e., concern, interest, and affection toward the environment (Wang et al., 2014). These environmental concerns, as an attitude towards a general or specific environmental issue, can create environmental attitudes towards the protection of the environment (Seow et al., 2020).

According to Bargas and Mathias (2011), urban parks are green areas with ecological, aesthetic, and leisure roles. As for Pereira (2013), social, educational, and psychological functions stand out. Thus, the benefits of green areas involve the opportunity to enjoy the preserved nature, increasing environmental awareness among citizens, and potentially influencing people's behavior (Dorigo & Ferureira, 2015).

Urban green areas, specifically parks, are external stimuli to influence people's behavior by offering direct contact with the environment (Williams & Dair, 2007). This statement is corroborated by Cleveland et al. (2005) and Kalamas (2014). The authors also mention the importance of direct contact with the environment to induce consumers to adopt sustainable behaviors. This contact leads consumers to present attitudes that are more responsible regarding the environment, modifying their behavior and the behavior of others.

Visits to urban green areas offer the opportunity to satisfy non-materialistic needs, such as feelings of introspection and unity with nature. The satisfaction of these needs increases the quality of life and the chance to reassess values that may support behavioral changes, thus constituting a key component for sustainable development

(Chiesura, 2004; Lima & Amorim, 2006; Prescott-Allen, 1991), this rationale supports the hypothesis (H1) guiding this research:

H1: More visits to urban green areas are positively related to sustainable consumption.

More visits can be used as a proxy for nature contact, the relationship between nature contact and pro-environmental behavior is far less established (Martin et al., 2020; Richardson & Sheffield, 2022; White et al., 2020). Previous studies have already pointed that greater nature contact can partially lead to better outcomes via improved psychological connectedness to nature (Martin & Sandor, 2016). Thus, visiting green areas, playing sports, obtaining personal benefits, and demonstrating environmental awareness are behaviors that may contribute to engaging people in environmental protection (Ghisellini et al., 2016; Kothari et al., 2014; Martins, 2010; Spaargaren, 2003).

The preservation of green areas in urban spaces becomes an important policy to promote quality of life and reduce environmental degradation. Such a policy can be designed based on promoting visits to the park by offering environmental education aiming to strengthen sustainable consumption habits. Environmental education programs can be improved with outdoor experiences such as nature visits (Lawrence, 2012; Palmberg & Kuru, 2000; Sandell & Öhman, 2010). Hence, policies should promote access to green areas supporting the potential role of this kind contact in attitudes and behaviour (Martin et al., 2020).

3 METHODOLOGY

The first step was defining the target public, the strategy to approach it, and the instrument and techniques for data collection and analysis. The research investigated people who visit an urban green area located in the State of São Paulo, Brazil, the “Parque Ecológico Dionísio Álvares Mateos.” The area is an ecological park occupying 52,800 m², counting on an environmental education center, and offering facilities and attractions such as a sports court, outdoor gym equipment, a playground, and a hiking trail.

3.1 Access to the target public and data- collecting instrument

The data-collecting instrument was a survey built based on the sample design and the collection instrument. In addition, a careful collection protocol was developed to consider the diversity of visitors on different days and times. The sample design considered the mobile populations, following the principles for sampling rare populations (Kalton, 1991, 2001). The design presents two stages of selection to approach the respondents.

In the first stage, the park's opening hours were selected as primary units. These units combine the seven days of the week and three periods (morning, afternoon, and night). The selection was made through probability proportional to size sampling, based on the number of visitors estimated after a one-week pilot survey. The pilot survey allowed us to assess the number of visitors who passed through the main entrance in each period. Also, it was possible to test the questionnaire and make improvements.

The second stage comprised the systematic selection of visitors, enumerated for a later interview. Thus, from the visitors enumerated, the first interviewee was selected randomly to guarantee the probabilistic collection, and all the others were selected sequentially, with a jump previously specified based on the number of visitors observed in the pilot survey. For example, for a random number 2 and a jump of 3, the visitors interviewed would be visitors number 2, 5, 8, 11, and so on, successively for the other periods selected in the first stage. Data collection took place over four weeks. Considering this design, a total of 170 visitors were selected for interview, but 134 planned interviews were obtained (almost 80%). Data collection took place in April 2016.

The data-collecting instrument included questions about the interviewees' profile, how often the interviewees visit the park on different days and periods, and their perception of sustainable consumption by asking if they purchase 24 items with options: 0 (never), 1 (almost never), 2 (almost always) and 3 (always). The

questionnaire items were adapted from the rationale in relation to the dimensions of sustainable consumption and research in the context of conscious consumption (Instituto Akatu, 2018), which informed that scale had been validated by experts.

3.2 Strategies of Analysis

The analytical techniques used were the nonparametric item response theory (NIRT) (Mokken, 1971) and regression models (Hair et al., 2009). The NIRT was used to simplify the quantity and complexity of the items representing sustainable consumption in dimensions reflecting the approach Rs. In addition, the dimensions avoid multicollinearity problems in the estimated regression models.

Table 1 – Description of variables

| Variable | Description |
|----------------------------------|--|
| Refuse ¹ | Little, if the sum of items 19, 20, 21, 22, 23, and 24 was less than the median. A lot, if this sum was more than the median |
| Recycle/Reuse ¹ | Little, if the sum of items 10, 11, 17, and 18 was less than the median. A lot, if this sum was more than the median. |
| Financial reduction ¹ | Little, if the sum of items 4, 6, 7, 8, and 9 was less than the median. A lot, if this sum was more than the median. |
| Visiting the park | Number of visits to the park weekly (Group 1: 1 or 2; Group 2: 3 or 4; Group 3: 5,6 or 7) |
| Gender | Male or Female |
| Age | Age in years |
| Marital status | Married or Other |
| Children | 0, 1, 2 or more |
| Number of people in household | Alone, 2, 3 or more |

¹ Details about definition in table 2

Hypothesis H1 was evaluated for each dimension defined by the NIRT regarding a higher frequency of visits to the park and other factors based on regression models –

particularly logistic regression, as the model offers the possibility to classify each dimension for sustainable consumption as little or a lot (Table 1).

In addition to the frequency of visitors, Table 1 shows the independent variables gender, age, marital status, number of children, and number of people living in the respondents' homes. The model allowed identifying the variables that better explain the interviewee's perception of sustainable consumption, particularly the hypothesis that a higher number of visits to the park in a week is correlated to a greater perception of sustainable consumption. The use of the NIRT is detailed in the next section.

4 RESULTS

This section presents the results in three parts; the first shows how to define the four dimensions formed by applying the NIRT technique and named according to the Rs (refuse, recycle/reuse, financial reduction, and reduction of natural resources). The second presents a brief descriptive analysis of the variables characterizing the respondents. Finally, the third part presents the main results in four logistic regression models, estimated to assess how the number of visits to the park per week and the other interviewees' characteristics would explain their perception regarding sustainable consumption considering the Rs.

4.1 Definitions of Dimensions for Sustainable Consumption

Table 2 presents the results of the NIRT, applied to assess the perception of individuals regarding sustainable consumption considering the 24 items. The study identified scales (item clusters) defining each dimension based on the response pattern. The NIRT is suitable for forming item clusters defining a coherent scale based on evaluation adopting scalability indexes (H index) at a significance level of 5%. As suggested by Mokken (1971), scales with H indexes less than 0.3 were discarded.

Table 2 – Definition of the dimensions of sustainable consumption using NIRT

Continue...

| Dimensions | Item | Per item ¹ | Per scale ¹ |
|------------------------|---|-----------------------|------------------------|
| Refuse | 19. When I see something harmful to the environment, I report it to the environmental control agencies or a nonprofit that can address the issue. | 0.380 (0.071) | |
| | 20. When I buy wooden products, I check if they have a certificate confirming they were obtained without harm to the environment. | 0.380 (0.071) | |
| | 21. I stop buying products from companies that do something harmful to society or the environment. | 0.380 (0.071) | 0.495 |
| | 22. I participate and encourage others to pressure politicians to create laws that help consumers choose, use, or dispose of products. | 0.425 (0.093) | (0.047) |
| | 23. If I find an advertisement inappropriate, I speak out about it and/or encourage others to do the same. | 0.582 (0.045) | |
| | 24. I discuss what people and society can do to solve environmental issues with my friends and family | 0.508 (0.064) | |
| Recycle / Reuse | 10. I use both sides of the paper when I need to print something. | 0.423 (0.107) | |
| | 11. My household separates recyclables | 0.511 (0.084) | 0.464 |
| | 17. I separate electronic waste (light bulbs, batteries, technology equipment). | 0.479 (0.093) | (0.087) |
| | 18. I donate clothes and other items I no longer use. | 0.413 (0.187) | |
| Financial reduction | 4. I wait for food to cool before putting it in the refrigerator. | 0.309 (0.103) | |
| | 6. My household plans food purchases. | 0.478 (0.057) | |
| | 7. I plan clothes purchases. | 0.425 (0.059) | 0.430 (0.055) |
| | 8. I always ask for a receipt. | 0.469 (0.056) | |
| | 9. I read product labels carefully before deciding to purchase. | 0.413 (0.065) | |

Table 2 – Definition of the dimensions of sustainable consumption using NIRT

| | | Conclusion | |
|--------------------------------|--|-----------------------|------------------------|
| Dimensions | Item | Per item ¹ | Per scale ¹ |
| Reduction of natural resources | 2. I avoid leaving lights on in empty rooms. | 0.545 (0.094) | |
| | 3. I switch off electronics when not in use. | 0.651 (0.066) | 0.577 (0.080) |
| | 15. I turn off the computer’s monitor when I have finished using it. | 0.531 (0.095) | |
| Non scalable | 1. I turn off the tap while brushing my teeth. | - | |
| | 5. I avoid throwing oil down the sink. | - | |
| | 12. My household buys organic products. | - | |
| | 13. I buy products that use recycled material. | - | - |
| | 14. I have short showers – less than 10 minutes. | - | |
| | 16. I use public transport when commuting during the week. | - | |

¹ Scalability (H) and Standard Deviation (SD) in parentheses

Thus, as a result, four dimensions were formed and named: Refuse, Recycle/Reuse, Financial Reduction, and Reduction of Natural Resources. The dimensions were named based on the theoretical foundation related to the Rs approach rationale and considered the interpretation of the respective item clusters. Table 2 also shows the items that were not scalable, that is, items that could not be associated with the others.

The refuse dimension encompasses items 19, 20, 21, 22, 23, and 24. Items 10, 11, 17, and 18 were clustered in the Recycle/Reuse dimension. Two dimensions were adopted for reduction: financial reduction (items 4, 6, 7, 8, and 9), and reduction of natural resources (items 2, 3, and 15) (Calisto Friant et al., 2020; Reike et al., 2018).

These four dimensions could be used as a form of measuring conscious consumption habits, as indicated by recent literature (Figueroa-García et al., 2018; Friedman, 2009; Holden, 2004; Jaca et al., 2018; Kalamas et al., 2014; Tripathi & Singh, 2016). Other than that, the way that these dimensions were bundled is

representative of different levels of consumption awareness, being the Refuse dimension representative of the most aware degree of consumption, Recycle/ Reuse the second most aware being followed, in order of degree of awareness, by Financial Reduction and Reduction of natural resources (Reike et al., 2018).

4.2 Profile of Respondents

Table 3 – Characteristics of respondents

| | | Frequency | Percentage |
|-------------------------------|------------------------------------|-----------|------------|
| Visiting the park | Group 1: 1 or 2 times per week | 48 | 35.8% |
| | Group 2: 3 or 4 times per week | 50 | 37.3% |
| | Group 3: 5, 6, or 7 times per week | 36 | 26.9% |
| Gender | Male | 68 | 50.7% |
| | Female | 66 | 49.3% |
| Marital status | Married | 69 | 51% |
| | Other | 65 | 49% |
| Children | 0 | 72 | 54% |
| | 1 | 38 | 28% |
| | 2 or more | 24 | 18% |
| Number of people in household | Alone | 36 | 27% |
| | 2 | 51 | 38% |
| | 3 or more | 47 | 35% |
| Total | Total | 134 | 100.0% |

The exploratory analysis of the 134 interviews characterizes the respondents' profile (Table 3). When analyzing the three groups defined according to the number of visits to the park per week, there are slightly fewer individuals who frequent the park a lot (27%) compared to the two groups that do not go as much. The respondents' average age was 41 years old, with a deviation of 11.5. In addition, a close distribution

was observed between genders and marital status (married or other). Almost half declare that they have no children (54%), and a quarter live alone (27%).

The design of the logistic regression model is done in order to assess the relationship between the respondents and the four dimensions of sustainable consumption. It will be measured whether more frequent trips to the park, gender, marital status, number of offspring and number of residents in the household are related to an improvement in the indicators of sustainable consumption that are given, in turn, by the four aforementioned dimensions, the results of these tests will be presented in the next section.

4.3 Relation between consumption profile and visits to the park

Four logistic regression models were estimated to assess how the frequency of visiting the park and other interviewees' characteristics could explain their perception regarding sustainable consumption based on the Rs. Table 4 shows the results of the estimation for each model and dimension.

Regarding the refuse dimension, the model shows that none of the characteristics related to gender, age, marital status, number of children, or number of people in household were statistically relevant (5% significance). As for the frequency of visits to the park, group 3 (5, 6, or 7 visits per week) is different when compared to group 1 (1 or 2 visits per week); that is, individuals who visit the park more often are four times more likely to present behaviors related to refuse. These individuals are more likely to make complaints to environmental control agencies or a nonprofit and stop buying products from companies that have already done something harmful to society or the environment.

The positive result in this dimension touches on the higher aspect of the Rs approach, which shows a more critical position of the consumer and reflects the shift to a more sustainable lifestyle (Hedlund-de Witt, 2012; Reike et al., 2018). Although studies have already shown the relationship between higher mileage of green areas in

a city and consumer behaviors, such as the refusal to buy certain products due to environmental reasons (Lo, 2016), this result can be considered to reflect on the difficulty to find ways to engage the individual toward more sustainable behavior patterns (Hobson, 2020; Kalamas et al., 2014). One way of acting may consist of using environmental education to break this outdated view of damage to the environment, allowing for a reduction in consumption and production even before the demand for consumption is created (Kothari et al., 2014; Spaargaren, 2003).

Observing the model results for the recycle/reuse dimension, gender, marital status, and number of people in household explain part of the habit of recycling/reusing. The estimated model shows that female interviewees are 54% less likely to recycle/reuse, those who declared not to be married were 5.2 times more likely to recycle/reuse, and interviewees living in households with three or more people have 73% less chance of recycling and reusing compared to those living alone. Since these socio-demographic factors are statistically different (5% significance) for individuals that recycle/reuse, they partially explain a more engaged behavior and could be considered priority behavioral aspects on which environmental education policies and actions could focus. As an example, actions could consider recycling awareness programs for women, for married individuals, or focus on households with more than three people, as these groups would be less likely to recycle/reuse (Ghisellini et al., 2016; Reike et al., 2018).

The results in Table 4 also show a relation between financial reduction and a higher frequency of visits to the park as there is a 2.3 times (at 10% significance) chance of interviewees presenting sustainable consumption patterns such as planning food and clothing purchases, reading labels, and requesting a receipt. Regarding the reduction of natural resources, only age was relevant; that is, the older the participant, the higher the chance of presenting this behavior.

The literature has already emphasized the need to advance in reducing consumption (Reike et al., 2018). For Witt (2012), regarding the individuals' responsibility, consumption patterns that are less aggressive to the environment tend

to occur when there is a significant change in people's worldview. Activities exploring the consumers' responsibility and promoting awareness are present in the literature (Ghisellini et al., 2016; Tripathi & Singh, 2016). These contributions are likely to encourage economic behaviors regarding the use of resources.

Hypothesis 1 is partially proven since the frequency of visits to the park positively correlates with the interviewees' perception of sustainable consumption in the studied dimensions. Thus, it is possible to say that when people visit urban green areas, such as the Dionísio Alvares Mateos park more often, they are also more likely to engage in behaviors of sustainable consumption.

These results corroborate studies that point to the correlation between higher levels of awareness and education with consumption habits that are less destructive to the environment. Chiesura (2004) points to higher levels of awareness in people who visit parks, while Arslan (2012) exposes that individuals who present environmental awareness and environmental concern also present environmentally conscious purchase behavior.

Dair and Williams (2007) and Holden (2004) reinforce that the context in which individuals live can shape their behavior, so actions toward changing the context to stimulate sustainable consumption should be considered. Wang et al. (2014) says that the positive relationship between environmental value and sustainable consumption behavior can improve the behavior both for the consumers' practices and for activities promoted in parks.

According to Lo (2016), greater green areas in a city is directly linked to better consumption habits that present less risk to the environment, such as the general effort to consume less and products that are less harmful to the environment. Thus it is clear the importance of creating and maintaining urban green areas and developing practical actions such as environmental education programs.

Finally, individuals who undergo critical changes in their thinking tend to adopt more sustainable behaviors (Tripathi & Singh, 2016). Thereby, it is important to explore

the positive influence of parks on social activities and environmental protection, dedicating efforts to organize such activities (Williams & Dair, 2007).

Table 4 – Results for the logistic regression model for each dimension of sustainable consumption

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| Variable | | Estimation | Standard Error | p value | Odds ratio | Limit Inf. | Limit Sup. | | |
|-------------------------------|-------------------------------|------------------------------------|------------------------------------|-----------------------|-------------------|-------------------|-------------------|-------------------|-------|
| Refuse | Visiting the park | Group 2: 3 or 4 times per week | 0.534 | 0.433 | 0.218 | 1.705 | 0.729 | 3.986 | |
| | | Group 3: 5, 6, or 7 times per week | 1.398 | 0.478 | 0.003 | 4.049 | 1.587 | 10.333 | |
| | Gender | Female | 0.051 | 0.367 | 0.889 | 1.053 | 0.513 | 2.159 | |
| | Age | | -0.007 | 0.023 | 0.752 | 0.993 | 0.950 | 1.038 | |
| | Marital status | Others | -0.389 | 0.492 | 0.430 | 0.678 | 0.258 | 1.779 | |
| | Children | 1 | -0.003 | 0.561 | 0.996 | 0.997 | 0.332 | 2.991 | |
| | | 2 or more | 0.408 | 0.700 | 0.560 | 1.504 | 0.381 | 5.931 | |
| | Number of people in household | 2 | -0.120 | 0.534 | 0.823 | 0.887 | 0.311 | 2.527 | |
| | | 3 or more | 0.361 | 0.637 | 0.571 | 1.434 | 0.411 | 4.998 | |
| | Constant | | -0.264 | 0.956 | 0.783 | 0.768 | 0.000 | 0.000 | |
| | Variable | | Estimation | Standard Error | p value | Odds ratio | Limit Inf. | Limit Sup. | |
| | Recycle/Reuse | Visiting the park | Group 2: 3 or 4 times per week | 0.628 | 0.474 | 0.185 | 1.874 | 0.740 | 4.749 |
| | | | Group 3: 5, 6, or 7 times per week | 0.393 | 0.505 | 0.437 | 1.481 | 0.550 | 3.989 |
| | | Gender | Female | -0.788 | 0.395 | 0.046 | 0.455 | 0.209 | 0.986 |
| Age | | | -0.039 | 0.025 | 0.125 | 0.962 | 0.915 | 1.011 | |
| Marital status | | Others | 1.664 | 0.560 | 0.003 | 5.282 | 1.764 | 15.819 | |
| Children | | 1 | -0.922 | 0.605 | 0.127 | 0.398 | 0.122 | 1.301 | |
| | | 2 or more | -0.998 | 0.766 | 0.193 | 0.369 | 0.082 | 1.654 | |
| Number of people in household | | 2 | -0.703 | 0.598 | 0.240 | 0.495 | 0.153 | 1.599 | |
| | | 3 or more | -1.776 | 0.710 | 0.012 | 0.169 | 0.042 | 0.681 | |
| Constant | | | 2.454 | 1.096 | 0.025 | 11.633 | 0.000 | 0.000 | |

Table 4 – Results for the logistic regression model for each dimension of sustainable consumption

| | | | | | | | Conclusion | |
|--------------------------------|-------------------------------|------------------------------------|-----------------------|----------------|-------------------|-------------------|-------------------|--------|
| Variable | | Estimation | Standard Error | p value | Odds ratio | Limit Inf. | Limit Sup. | |
| Financial reduction | Visiting the park | Group 2: 3 or 4 times per week | 0.507 | 0.444 | 0.254 | 1.660 | 0.695 | 3.963 |
| | | Group 3: 5, 6, or 7 times per week | 0.852 | 0.487 | 0.080 | 2.344 | 0.903 | 6.087 |
| | Gender | Female | 0.246 | 0.372 | 0.508 | 1.279 | 0.617 | 2.652 |
| | Age | | 0.033 | 0.023 | 0.150 | 1.034 | 0.988 | 1.082 |
| | Marital status | Others | -0.356 | 0.508 | 0.483 | 0.700 | 0.258 | 1.897 |
| | Children | 1 | 0.416 | 0.562 | 0.459 | 1.516 | 0.504 | 4.564 |
| | | 2 or more | 1.137 | 0.742 | 0.126 | 3.118 | 0.728 | 13.352 |
| | Number of people in household | 2 | 0.044 | 0.552 | 0.937 | 1.045 | 0.354 | 3.081 |
| | | 3 or more | -0.249 | 0.643 | 0.698 | 0.780 | 0.221 | 2.747 |
| | Constant | | -1.747 | 0.984 | 0.076 | 0.174 | 0.000 | 0.000 |
| Variable | | Estimation | Standard Error | p value | Odds ratio | Limit Inf. | Limit Sup. | |
| Reduction of natural resources | Visiting the park | Group 2: 3 or 4 times per week | -0.789 | 0.480 | 0.100 | 0.454 | 0.177 | 1.164 |
| | | Group 3: 5, 6, or 7 times per week | -0.153 | 0.500 | 0.760 | 0.858 | 0.322 | 2.285 |
| | Gender | Female | 0.171 | 0.397 | 0.666 | 1.187 | 0.545 | 2.583 |
| | Age | | 0.076 | 0.026 | 0.004 | 1.079 | 1.024 | 1.136 |
| | Marital status | Others | 0.491 | 0.534 | 0.358 | 1.633 | 0.573 | 4.653 |
| | Children | 1 | 0.427 | 0.614 | 0.487 | 1.532 | 0.460 | 5.104 |
| | | 2 or more | -0.735 | 0.748 | 0.326 | 0.479 | 0.111 | 2.078 |
| | Number of people in household | 2 | -0.949 | 0.596 | 0.111 | 0.387 | 0.120 | 1.245 |
| | | 3 or more | -1.163 | 0.706 | 0.099 | 0.313 | 0.078 | 1.246 |
| | Constant | | -2.143 | 1.027 | 0.037 | 0.117 | 0.000 | 0.000 |

5 FINAL CONSIDERATIONS

The notion that consumption and production are the main cause of environmental degradation is well accepted and widely discussed. Therefore, it is crucial to research the phenomenon of consumption and address this issue. The international community and international governmental agencies propose sustainable consumption as a solution. They argue that the use of goods and services would improve the quality of life and minimize the environmental impact. However, this consumer behavior still lacks actions to become more sustainable.

Urban green areas can be considered factors that influence individuals' behavior, offering solutions to improve the relationship between human beings and nature toward sustainable consumption. Thus, this study explores the correlation between how often individuals visit urban green areas and their perception of sustainable consumption.

A survey was conducted to collect the data, using the nonparametric item response theory to define the dimensions for sustainable consumption (refuse, recycle/reuse, financial reduction, and reduction of natural resources). Also, logistic regression models were estimated to evaluate the hypothesis that a higher frequency of visits to urban green areas is correlated to a more disciplined and informed view regarding sustainable consumption.

The hypothesis was partially proven since the respondents who went to the park more often appear to be more likely to adopt the sustainable consumption behaviors presented in the refuse dimension. Avid visitors show more socially and environmentally engaged behavior, and their behavior is more likely to reflect financial reduction and reduction of natural resources. The influence of the number of visits to the park per week on the individuals' attitudes suggests that such urban green areas are recommended places to carry out socio-environmental education activities. Therefore, cultural and educational activities in parks may be alternatives to develop environmental education, considering that the interaction with nature helps to raise awareness and improve consumption patterns.

This study brought important findings, the first is to present the importance of urban green areas to change the individuals' behavior toward sustainable consumption. The second contribution is testing how urban green areas influence different dimensions of sustainable behavior. Based on these contributions, future studies could emphasize the conceptual support to create and improve public policies towards more sustainable consumption. This research offers a reflection regarding the promotion of individual behaviors and collective actions leading to political and economic changes necessary to incorporate sustainable consumption.

Finally, the main research limitation lies in the fact that data was collected in a single urban area. However, this effort is the beginning of a process that needs further and more in-depth studies to stimulate discussions in academia and other spaces in a participatory and constructive way. These next steps will contribute to answering the questions involving the different interfaces of sustainable consumption, exploring further the findings observed in the relationship between the dimension recycle/reuse and the independent variables gender, marital status, and the number of people living in household, and the dimension reduction of natural resources and the variables age and number of children.

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| 3. Development of theoretical propositions (theoretical work) | | | |
| 4. Theoretical foundation / Literature review | √ | √ | √ |
| 5. Definition of methodological procedures | | | √ |
| 6. Data collection | √ | | |
| 7. Statistical analysis | | | √ |
| 8. Analysis and interpretation of data | √ | √ | √ |
| 9. Critical revision of the manuscript | √ | √ | √ |
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