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Backpackers' space–time behavior in an urban destination: The impact of travel information sources

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Abstract

This research aims to identify the information sources used by backpackers before and during the visit to an urban destination and its influence on the movements performed. It uses a questionnaire survey combined with a GPS app to track the movements of backpackers to identify backpackers' spatiotemporal behavior. A bivariate analysis using non-parametric tests was used to examine the relationships between variables. This study concludes that the consulting online information before the visit has a great deal of influence on the spatiotemporal behavior of the backpackers, namely on the linearity and intensity of the visit. If online information sources are very important due to the intense use of information by backpackers, word of mouth from other travelers should not be disregarded as an important information source. This research can contribute to the definition of more informed and differentiating tourism marketing strategy considering the information sources used and its influence on the movements performed during the visit.

KEYWORDS
backpackers, space–time behavior, travel information sources, urban destinations

1 | INTRODUCTION

The number of young tourists has recorded one of the fastest growth rates worldwide (UNWTO, 2016; UNWTO & WYSE Travel Confederation, 2010), and among them backpackers are a growing segment in the tourism industry. If there were no COVID-19 pandemic, numbers would probably have reached 370 million young tourists during 2020, including the backpacker tourist segment, which would had been responsible for expenses in the order of USD 400 billion (UNWTO, 2016). As a distinct form of tourism, backpacking tourism has had a rapid increase in its visibility; Chen & Huang, 2019; O' Regan, 2018). These studies have focused on two main research areas, on backpackers themselves and on topics related to the growth and impact of this segment, although it is expected that backpacker tourism will continue to be a significant international phenomenon in various economies and societies (Chen & Huang, 2019) from both developed and developing countries. However, research on information sources and their influence on the spatiotemporal behavior of backpackers in urban destinations are scarce.

Literature has identified well-known travel guidebooks (e.g., Lonely Planet) and word-of-mouth (WOM) information among travelers (Iaquinto, 2012; Richards & Wilson, 2004b) as the most important information sources consulted by backpackers. As a result of the communication technologies and the internet, the demand for information about destinations has undergone profound changes (de la Hoz-Correa & Muñoz-Leiva, 2019). The internet is now the most used information source in travel planning (Xiang et al., 2015) and backpackers are no exception, since social networks have become increasingly popular among millennials and young people (Guerreiro et al., 2019). It is known that the information sources used before and during the visit, influence tourists in the movements made in the destination and can contribute to the definition of a differentiating marketing strategy taking into account the different tourist segments (Almeida-Santana & Moreno-Gil, 2017). This may enhance the competitiveness of destinations (van der Zee et al., 2020), particularly of small and medium-sized tourist companies, as they have less human and financial resources at their disposal, and their marketing and sales strategies are more dependent on their visibility on large online platforms (e.g., TripAdvisor or

Booking.com). Those responsible for destination management organizations (DMOs) know that the ability to attract tourists is crucial for the success of tourist businesses (Korneliussen & Greenacre, 2018), whose marketing strategies must be supported so that the information on tourist destinations reaches tourists, not only during the preparation of the trip, but also before and during the days dedicated to the visit.

The more information tourists gather, the more knowledgeable they are about the range of attractions available in the visited region (Tideswell & Faulkner, 1999). As such, in an urban destination with various attractions, there will be a greater probability of visiting more attractions and making longer and lengthy daily itineraries with more complex itineraries. As backpackers are usually described as being predominantly young and high-tech friendly, they often use the internet to search for information when planning their visits. The internet provides a large and diverse set of tourism information and in line with that, it is therefore pertinent to investigate whether the information obtained online has a different impact on their space–time behavior, in contrast to information gathered offline.

Although tourism in urban spaces is one of the most popular forms of tourism, the spatiotemporal behavior of tourists in urban spaces remains under-researched (Shoval et al., 2011). Understanding the movements made and their relationships with the decisions that tourists make about where, how and at what places and times they move from one attraction to another remains a process of great complexity because there are several factors influencing it (Lew & McKercher, 2006; Xia et al., 2011). As Shoval et al., (2015), p. 80 point out "Human spatial behavior is the sum of three parallel dimensions: "what," "when," and "where." The "what" describes the type of activity performed, the "when" the temporal dimension of that activity and the "where" its spatial element." The existing literature on the spatiotemporal behavior of tourists has focused on the choices of the destination, the experience of tourists, their segmentation and the way the destination is consumed (Grinberger et al., 2014), on the cultural origin of tourists (Dejbakhsh et al., 2011), on tourists who visit the destination for the first time and repeatedly (Caldeira & Kastenholz, 2018b; McKercher et al., 2012), on the first and last day of the visit (Mckercher & Lau, 2008) and on sociodemographic characteristics (Espelt & Benito, 2006; Tchetchink et al., 2009; Xia et al., 2010). Other studies focus on the satisfaction of tourists (Caldeira, 2014), the impact of the distance traveled from the country of origin to the country of destination (Caldeira & Kastenholz, 2015) or on environmental sustainability (Dickinson et al., 2013; Edwards & Griffin, 2013). However, no research has yet addressed the spatiotemporal behavior of backpackers during their visit to an urban destination or the impact of the information sources consulted during the visit.

To address this gap, this article investigates how the information sources used by backpackers during a day of visiting an urban destination influence their spatiotemporal behavior. It is one of the first studies to successfully use a free, open-access GPS app to track the movements of tourists. As such, this article aims to answer the following research questions:

RQ1. What are the information sources used by backpackers before and during their visit to an urban destination?

RQ2. What are the main types of information sources used by backpackers regarding their spatiotemporal behavior?

RQ3. What is the behavior of backpackers regarding the use of word-of-mouth information sources?

This article is organized in five sections. After the introduction, Section 2 reviews the literature addressing the main topics under analysis, namely: backpackers, tourist information sources, and spatial–temporal behavior of tourists. Section 3 is dedicated to the methodology used in the collection and treatment of information. Section 4 analyses and discusses the results obtained. Finally, the main conclusions are presented in Section 5, highlighting their theoretical, methodological, managerial, and marketing contributions to the destination.

2 | LITERATURE REVIEW

2.1 | Backpackers

Despite the current demographic dynamics of most Western countries, characterized by the marked aging of the population as a consequence of the continuous reduction of birth rates and increasing life expectancy indexes, youth tourism has been growing and affirming itself as one of the most important tourist segments worldwide (UNWTO, 2016). In the context of youth tourism, backpacker tourism has assumed special relevance and is considered as one of the predominant trends in contemporary tourism (Ateljevic & Doorne, 2004; Cohen, 2011). However, Dayour et al. (2017) point out the lack of consensus and inconsistencies among different researchers who have been working on backpacker tourism due to the lack of a uniform criterion for operationalizing the backpacker concept. While some authors use age or motivations to travel as a distinctive criterion, for example, (Pearce, 1990; Chen et al, 2014), others select the characteristics of the trip, such as the type of accommodation or the duration of the trip (Adam, 2015; Pearce, 1990), belonging to a virtual community (O'Reilly, 2006; Paris, 2012), the enclaves (Sørensen, 2003), self-recognition as backpackers (Reichel et al., 2007) or the economic criterion (O'Reilly, 2006). As such, it is important to conceptualize what a backpacker is and what criteria should be used to distinguish them from other tourist segments.

The most used definition describes backpackers as individuals who travel on a budget for long (instead of short) periods of time, with an independent and flexible travel itinerary through several destinations, choosing budget accommodation and with an emphasis on meeting other travelers and locals (Loker-Murphy & Pearce, 1995; Pearce, 1990). As a result of its complexity, the various sub-segments that were identified (Martins & Costa, 2017) and the need to include backpacking tourists in official statistics, Tourism Research Australia (2009), p. 1 defines backpacker tourists in a succinct and objective way as "a person who spends one or more nights in a backpacker or hostel accommodation." In the present study, the latter perspective is adopted, considering backpackers all the tourists who stay in hostels.

2.2 | Information sources

Before traveling, tourists usually seek information about their holiday destination and accommodation in order to ensure that they make the best choice, thus reducing uncertainty (Hernández-Méndez et al., 2015; Xiang et al., 2015). Therefore, the search for information is crucial when choosing a destination to visit (Jacobsen & Munar, 2012). As visitors' need for information varies substantially and is usually incomplete (Fodness & Murray, 1997; Lew & McKercher, 2006), understanding the destination and choosing what activities to carry out is a highly individualistic capacity, although subject to considerable external influence (Lew & McKercher, 2006).

According to Bauder and Freytag (2015), studies on tourist information sources and travel preparation focus their attention on where and how tourists look for information about the destination and also about the type of information searched. Therefore, the information sources used by tourists can be of an internal or external nature (Bauder & Freytag, 2015; Jacobsen & Munar, 2012; Korneliussen & Greenacre, 2018; Lau, 2007; Yasin & Baghirov, 2017) and are directly related to previous travel experiences, that is, prior knowledge of the destination. When tourists visit a destination for the second time, they will certainly use prior knowledge about it, and if their internal knowledge is insufficient, they will use external sources such as traditional travel guides, the internet, or agencies, among others (Korneliussen & Greenacre, 2018; Lau, 2007).

While Korneliussen and Greenacre (2018) investigate the most used information sources by European Union tourists in selecting the destination to visit, Yasin and Baghirov (2017) identify the most popular information sources used by tourists visiting Turkey, analyzing how travel experiences and tourists' gender influence the choice of information sources. On multi-destination trips to South Korea, Lee et al. (2019) found that tourists who do not seek information online execute movements in several directions, visiting other regions outside the capital, Seoul, while tourists who operate online searches are dependent on the region where the capital is located. That happens because online tourism information about South Korea does not provide appropriate tourism information to fulfill the needs of international tourists. The way in which tourists seek and utilize information when visiting Paris is investigated by Pirolli (2018), concluding that online search engines are among the most influential information sources, in line with Mariussen et al. (2014), who claim that online information sources are among the most used in initial searches about the destination.

With the growing presence of the internet and information and communication technologies, the demand for information by tourists has undergone significant changes (de la Hoz-Correa & Muñoz-Leiva, 2019). Due to their intensive internet use, younger tourists have been called "digital natives" (Prensky, 2001). Furthermore, since the backpacker segment is predominantly made up of younger tourists who organize their visits independently, it is expected that new technologies will play a very important role in the preparation of their trips and even during the visits they make to a given destination. Reisenwitz and Fowler (2019) compared the information search process between Generation Y-ers (born between 1977 and 1994) and Generation X-ers (born between 1965 and 1976) and conclude that Generation Y tourists, who have a high use of online social interaction, use more technologies to search for information when planning their trips. Focusing in the differences on the use of social media for travel, Amaro et al. (2016) also identified different segments among travelers according to the degree of involvement in consumption and creation of travel contents. They found five different segments of social media users (inactive; occasional consumers and apathetic creators; occasional consumers and creators; consuming enthusiasts and apathetic creators; and fully engaged) and claim that the use of social media is higher before the trip than during and after the trip.

More recent studies have focused on the importance of information provided by tourist information offices (Araña et al., 2016), on the understanding how tourists use the internet to search for and collect information about destinations (Hernández-Méndez et al., 2015; Pirolli, 2018; Reisenwitz & Fowler, 2019) or in the analysis of the influence that social networks seem to have on the choice of destinations and their loyalty to them (Almeida-Santana & Moreno-Gil, 2017). Danish and Norwegian tourists visiting Majorca (Jacobsen & Munar, 2012) who used extensively computers and the internet, not only before but also during the visit, confirmed that tourists who are interconnected through electronic social networks, like Facebook, use the internet more intensively during the decision-making process. Furthermore, the official website of the organization responsible for the destination's marketing (Turismo de España) was shown to have very little importance in the decision-making of Danish and Norwegian tourists visiting Majorca (Jacobsen & Munar, 2012).

The influence of the information sources used by tourists in their movements while visiting an urban destination has not yet been properly analyzed. According to Lau (2007), the availability of information and the way in which tourists understand it may affect the choice of itineraries, as the subjective knowledge in relation to the destination that is obtained during the search for information increases not only familiarity with the destination, but also the possibility of showing a more extensive movement pattern. In a multi-destination travel context, Tideswell and Faulkner (1999) found that tourists who seek more information are more inclined to visit more destinations, which leads to greater spatial dispersion. In addition, the existence of limited information at destinations, such as lack of transport schedules and the absence of maps with detailed information, contributes to the tourists' frustration in relation to the movements they could have made (Edwards et al., 2009), limiting their spatiotemporal behavior. When analyzing the influence of travel preparation on the spatial behavior of tourists, Bauder and Freytag (2015) conclude that those who prepared their trip better tend to organize their stay in a more efficient and structured way, allowing them to concentrate on specific places, and they also choose a variety of more dispersed activities, even outside the city center.

2.3 | Spatiotemporal behavior of tourists

As analyzed by Ferrante et al. (2016), the spatiotemporal behavior of tourists has been analyzed from different perspectives, taking into

account: the scale of analysis of the movements made, that is, between various destinations (inter-destination), among several attractions within the destination (intra-destination) and still within an attraction (intra-attraction); the geographic scale of the visited area, that is, a region, an urban area or just an attraction, such as a theme fair or zoo; and the main factors determining the mobility of tourists.

The literature on spatiotemporal behavior of tourists covers diverse topics. It reveals several contributions in the following strands: in the planning and management of destinations (Beeco et al., 2013; Ferrante et al., 2016); in the development of tourism products, marketing strategies and commercial viability of tourist activities in order to improve the image of destinations (Caldeira, 2014; Ferrante et al., 2016; Lew & McKercher, 2006; Shoval & Ahas, 2016; van der Knaap, 1999); in the management of social, environmental and cultural impacts of tourism (Caldeira, 2014; Lew & McKercher, 2006; Shoval & Ahas, 2016); in the location of new attractions and accommodations (Caldeira, 2014; Lew & McKercher, 2006; Mckercher & Lau, 2008; van der Knaap, 1999); and in the identification of the strengths and/or weaknesses of tourism activity and structure at the local, regional or national scale. The most popular attractions, how much time tourists spend at each place or attraction and which routes are mostly used were identified (van der Knaap, 1999; Xia et al., 2011).

To analyze the space–time behavior of tourists, researchers have identified a diverse set of factors with impact on the spatiotemporal movement patterns. According to Caldeira (2014) and Caldeira and Kastenholz (2020), tourists' spatiotemporal behavior in the urban intra-destination context must take into account the characteristics of the tourists, the characteristics of the trip and the characteristics of the visited destination, as they analyze the movement (territoriality, linearity, locomotion and wayfinding) and multi-attraction (intensity and specificity) of the tourists. Regardless of the destination, the characteristics of tourists—namely their sociodemographic particularities such as age, gender, education, country of origin, level of education, income, among others—are variables that have been frequently used in several studies on spatiotemporal behavior of tourists (Caldeira, 2014; De Cantis et al., 2016; Edwards et al., 2009; Espelt & Benito, 2006; Hunt & Crompton, 2008; Koo et al., 2012; Le-Klähn et al., 2015; Xia et al., 2010; Zakrisson & Zillinger, 2012).

The characteristics of the destination correspond to physical characteristics that influence the choice of itineraries by tourists, such as the configuration of the destination and the transport network or the location of attractions (Lau & McKercher, 2006). The literature also refers to the location of the accommodation (Dejbakhsh et al., 2011; Shoval et al., 2011) and the climate/weather conditions (Caldeira & Kastenholz, 2018a; Espelt & Benito, 2006; McKercher et al., 2014) as other conditioning factors for spatiotemporal behavior.

The characteristics of the visit, such as the characteristics of the group (number of members, type of group, presence of children), duration and phase of the stay, knowledge and familiarity with the destination, that is, previous experiences and information sources used by tourists and the influence that these variables have on spatiotemporal behavior in destinations, have also been analyzed in several studies (Caldeira & Kastenholz, 2018b; Chang, 2012; De Cantis et al., 2016; Ferrante et al., 2016; Keul & Kühberger, 1997; Lau & McKercher, 2006; Le-Klähn et al., 2015; Lew & McKercher, 2006; Masiero & Zoltan, 2013; McKercher et al., 2012; Oppermann, 1997; Ritchie & Dickson, 2007; Xia et al., 2010; Zoltan & McKercher, 2014).

3 | RESEARCH APPROACH AND METHODS

3.1 | Smartphone questionnaire and application (app)

The target population of this study consisted of backpackers visiting the urban destination of Porto, Portugal, classified as a World Heritage Site by UNESCO in 1996. As backpackers are independent tourists with an allocentric profile, they are more likely to be inquisitive and curious and exhibit an increased level of spatial activity. Based on previous literature, it was clear that the linkage between the amount and type of information obtained by tourists prior or during a visit and their space–time behavior has not been explored. Based on the preceding discussion and in line with the proposed model of analysis based on the dimensions: movement and multi-attraction (Caldeira & Kastenholz, 2020), this article focuses on the impact of the information sources used by backpacking tourists on their spatiotemporal behavior during their visit to a multi-attraction urban destination.

This study analyzes the characteristics of the visit, namely, the influence of information sources on backpackers' space–time behavior. All movements made by backpackers during a day visit to the city of Porto, Portugal were analyzed through the framework proposed by Caldeira and Kastenholz (2020), using the variables described in Table 1.

Data collection was performed using a questionnaire survey ($n = 252$) and GPS tracking ($n = 82$) of movements made during a visit day. The combination of the two methods (GPS tracking and questionnaire) has become common in studies on the spatiotemporal behavior of tourists (Gali & Aulet, 2019; Bauder et al., 2014; Caldeira & Kastenholz, 2015; De Cantis et al., 2016; Edwards & Griffin, 2013; Ferrante et al., 2016; Grinberger et al., 2014; Yun & Park, 2014) as it allows the collection of rich and rigorous information (Zakrisson & Zillinger, 2012). Tracking backpackers allows to obtain information and to know the exact movements and routes they performed. On the other hand, the questionnaires enrich the georeferenced information with other relevant data related to the sociodemographic characteristics of the tourists, the information sources used before and during the visit and their motivations, among others. Data collection was carried out in several hostels located in the urban destination of Porto, Portugal that previously authorized access to its facilities.

The participants were approached randomly at the reception of the hostels during the mornings on any day of the week at the time they were preparing to visit the destination. After a short explanation of the research objectives, the researchers asked for their collaboration, requesting the installation of the *Open GPS Tracker* app for

TABLE 1 Information sources used by backpackers ($N = 82$)

Type of information sources (*)	Before the visit		During the visit		Booking		Did not use	
	n	%	*n*	%	*n*	%	*n*	%
Word-of-mouth information sources (WOM)								
Family and friends	31	37.8	9	11.0	–	–	34	41.5
Other travelers	32	39.0	31	37.8	–	–	15	18.3
Offline information sources								
Articles in magazines/newspapers	11	13.4	3	3.7	–	–	61	74.4
Travel guidebooks (e.g., Lonely Planet, Rough Guide…)	28	34.1	25	30.5	–	–	35	42.7
Tour brochures	11	13.4	18	22.0	–	–	49	59.8
Business information sources								
Retail travel agent	1	1.2	1	1.2	1	1.2	70	85.4
Tour operators	7	8.5	8	9.8	6	7.3	57	69.5
Travel expos/events	6	7.3	2	2.4	0	0.0	68	82.9
"Porto Discount Card" acquisition	0	0.0	1	1.2	0	0.0	72	87.8
Online information sources								
Online search engines (e.g., Google.com…)	63	76.8	31	37.8	4	4.9	8	9.8
Online student/backpacker travel agencies	6	7.3	1	1.2	2	2.4	66	80.5
Government tourism websites (e.g., www.visitporto.travel)	17	20.7	5	6.1	–	–	57	69.5
Blogs on the internet	26	31.7	12	14.6	–	–	46	56.1
Social networking sites (Facebook…)	22	26.8	10	12.2	–	–	44	53.7
Airline booking websites	16	19.5	1	1.2	18	22.0	37	45.1
Accommodation booking websites (hostelworld.com, Booking.com…)	38	46.3	6	7.3	28	34.1	16	19.5
Online travel review (e.g., TripAdvisor)	25	30.5	15	18.3	1	1.2	42	51.2
Other travel websites	15	18.3	3	3.7	1	1.2	58	70.7

Source: Pearce et al. (2009). Adapted. (*) possibility of more than one answer.

Android operating systems, and the *Simple Loger* app for iOS operating systems. Backpackers were asked to start up their apps as soon as they left the hostel. These apps are free, easy, and quick to install. In addition to the oral explanation, detailed written information was always provided regarding its installation from Google Play or the Apple App Store until it was operational and sending collected data. It was always reiterated that the tracking was not done online or in real time and that the researcher would only have access to the data collected after it was sent to his email address. All information collected remained anonymous. Upon arrival at the hostel, the backpackers who participated in the study were asked to respond to a questionnaire structured in two parts: the first regarding the profile of backpacker and the characteristics of the trip; the second related to the characteristics of the visit (i.e., information sources used), mobility and the attractions visited, and activities carried out.

Although the use of GPS equipment to track the movements of tourists has been widely used in studies regarding spatiotemporal behavior, the use of smartphones in academic studies is still at an early stage (Birenboim & Shoval, 2015; Shoval & Ahas, 2016). Smartphones add a set of various sensors and technologies that make these devices a true hybrid tracking system with broad potential. Thimm and Seepold (2016) developed a GPS app for Android and compared its use with a GPS device. They conclude that most tourists approached who agreed to participate in the study (although the older the tourists the more reluctant they are to use new technologies) ended up not downloading the application to their smartphones. In another context, Yun and Park (2014) successfully used a GPS app to analyze the spatial and temporal movement of visitors to a festival in a rural area in South Korea, with 72.6% of participants sending the information collected to researchers during the 5 days of the event, using georeferenced information from 66 tracks. Recently, Yun et al. (2018) also used a well-known South Korean platform (http://www.tranggle.com) to collect tourist routes visiting Seoul, obtaining the participation of 339 tourists, that is, 61.19% of those who agreed to participate in the study. In the end, they managed to obtain 233 (42.06%) valid tracks. This collection technique differs from that used in this study, in that the trackes must be uploaded by tourists on an online platform, while in this study, tourists share the file corresponding to the route made by email. Therefore, the use of a free-of-charge GPS app to track tourists in a study of their spatiotemporal behavior in a multi-urban urban context has not been deeply explored.

Of the 252 validated questionnaires, 32.53% ($n = 82$) correspond to backpackers who agreed to track their visit during one day. The 82 tracks obtained in this study correspond to 32.53% of the total participants ($n = 252$), a participation rate well above the 15% recorded by Miyasaka et al. (2018). Although the number of screenings is not very large, it is important to note that the sample obtained is larger than the screenings carried out in other research projects such as Miyasaka et al. (2018), Yun and Park (2014) or in the study conducted by Shoval and Isaacson (2007) in the ancient city of Akko, Israel, where only 40 GPS tracks were used (16.26% of the total). In another study, Iaquinto (2012) uses only 74 questionnaires, mitigating the disadvantages of a small sample by comparing the results with those of other studies. In addition, each tracking obtained represents one track/exit, regardless of whether it was performed alone, as a couple or in a group.

Although the use of smartphone applications is still at a preliminary stage regarding studies of spatiotemporal behavior, this study has shown that a GPS app available on the market and free of charge can be successfully used.

Data were analyzed using the IBM SPSS software, version 22 for Windows (IBM Corp. Released, 2013). The variables under study were characterized using the median, mean, and SD (quantitative variables) and absolute (n) and relative (%) frequencies (qualitative variables). As a result of the small sample size analyzed and considering the lack of homogeneity of variances of certain variables, it was decided to use bivariate analysis using non-parametric tests. According to Maroco (2010), p. 213 "it is generally accepted that non-parametric tests are less powerful than the corresponding parametric tests (…); however, this statement is only really robust for samples of large and equal size. For samples of small and different sizes and where the variables under study do not follow the assumptions of the parametric methods, the non-parametric tests can be more powerful."

As a result of the asymmetric distribution of most of the studied variables and considering the small sample size used to address the information sources used by backpackers and their characteristics, the following non-parametric tests were used to study the relationships between variables: Mann-Whitney test, Kruskal-Wallis test, and Fisher's exact test. A significance level of 10% was also considered.

As presented in the introduction section, this research aims to answer the following research questions:

RQ1. What are the information sources used by backpackers before and during their visit to an urban destination?

RQ2. What are the main types of information sources used by backpackers regarding their spatiotemporal behavior?

RQ3. What is the behavior of backpackers regarding the use of WOM information sources?

RQ1 will be analyzed considering the information sources used by backpackers during the day of the visit, shown in Table 2. The information sources used result from the literature review carried out and were grouped into four main types of information sources. Furthermore, as the impact of the information sources used by tourists during a day visiting an urban destination has not yet been explored, it was decided to group the information sources present in the questionnaire according to the following categories: WOM information, offline and online information sources, and business information sources.

To address RQ2, the main types of information sources will be analyzed. However, backpackers use online and offline information sources. The former will be disaggregated to be characterized according to online travel reviews and online search engines and the latter will be addressed more specifically to travel guides.

Considering the pertinence of WOM activities, RQ3 will address the main type of WOM information source, which will be analyzed individually based on how the WOM of "family and friends" and "other travelers" influences backpackers.

4 | RESULTS AND DISCUSSION

4.1 | Backpacker's profile

As shown in Table 1, among the 82 backpacker tourists who successfully GPS-tracked their movements during a day of visiting the city of Porto, there are 39 (47.6%) females and 43 (52.4%) males, most of them single (70.7%) or in a relationship (22%), with high levels of education (approximately 83% have higher or postgraduate education) and working full time (50%) or part time (9.8%), although the percentage of students is still relevant (29.3%).

With an average age of 26.6 years, this group of tourists is very young, with moderate to high annual incomes: of the 68 tourists who answered this question, 48.5% stated their income as above 20 thousand euros per year (Table 1). Regarding nationality, the vast majority come from European countries (68.3%), with Germany being the most represented country, followed by countries in the American continent (23.2%) and East Asia and the Pacific (8.5%), where Australia stands out. These data are in line with the statistics presented by the Instituto de Planeamento e Desenvolvimento do Turismo (2017) regarding the profile of visitors in Porto and northern Portugal, where the European market is the most important issuing market.

4.2 | Backpackers information sources used during the visit

To answer RQ1, the main information sources shown in Table 2 were analyzed as they give information regarding the spatial–temporal behavior of backpackers in four main groups: (a) WOM information sources; (b) offline information sources; (c) business information sources; and (d) online information sources.

It can be concluded that WOM information sources are particularly important before the visit, especially from family and friends; however, 41.5% of backpackers do not use WOM information from family and friends. On the other hand, other travelers exert an important influence before and during the visit.

It is particularly relevant that business information sources are not particularly popular among backpackers as retail travel agents, travel expos/events and "Porto Discount Card" acquisitions are not

TABLE 2 Sociodemographic characteristics ($N = 82$)

Variables	Categories	N	%
Gender	Male	43	52.4
	Female	39	47.6
Education	Secondary/high school	14	17.1
	College/University degree	51	62.2
	Master's	15	18.3
	PhD	2	2.4
Marital status	Single	58	70.7
	In a relationship/non-marital partnership	18	22.0
	Married	2	2.4
	Separated/divorced	3	3.7
	Other	1	1.2
Children	No	78	95.1
	Yes	4	4.9
Occupation	Employee full-time	41	50.0
	Employee part-time/casual	8	9.8
	Student	24	29.3
	Unemployed	6	7.3
	Other	3	3.7
Annual income (€) ($N = 68$)	<3000	10	14.7
	3000–7000	9	13.2
	7001–14,000	7	10.3
	14,001–20,000	9	13.2
	20,001–30,000	17	25.0
	>30,001	16	23.5
World tourism regions	Europe	56	68.3
	Americas	19	23.2
	Asia and the Pacific	7	8.5

Source: Own construction.

used in 80% of cases. It is also important to mention that offline information sources are used differently among backpackers. While most of them do not resort to offline information sources, only travel Guidebooks are particularly welcome before the visit (34.1%) or during visit (30.5%).

Online information is the most important of the sources analyzed, although the result varies extensively. Online search engines are the most important source of information both before (76.8%) and during the visit (37.8%). Accommodation booking websites are also very important especially before the visit (46.3%) and when booking (34.1%). Airline booking websites are also important especially when booking (22%) and before the visit (19.5%). However, the rest of the sources analyzed are not particularly important as they are not usually used as an information source: online student/backpacker travel agencies (80.5%), other travel websites (70.7%), government tourism websites (69.5%) and blogs on the internet, social networking, and online travel review (all with more than 50%).

When we analyze the information sources backpackers use before, during and when booking, the visit the results differ. Before the visit, online information sources as search engines (e.g., google.com) with 76.8% and accommodation booking websites (46.3%) are the two most important. WOM from other travelers (39%) and from other friends and/or family members (37.8%) were also important information sources. Travel guidebooks continue to be among the preferred offline information sources for backpackers (34.1%).

During the visit, the most relevant information sources used by backpackers were online search engines (37.8%), WOM from other travelers (37.8%), and travel guidebooks (30.5%). The information sources used by backpackers during booking are not surprising, with accommodation and airline websites with the highest scores (34.1% and 22%, respectively).

4.3 | Comparing online travel reviews and online search engines within online information sources

As shown in Table 3, backpackers who used internet search engines (i.e., Google) visited a greater number of attractions ($p = 0.014$) and

were involved in more activities ($p = 0.038$) than those who did not use them. These backpackers also used landmarks in the urban landscape (74.2% vs. 41.3% $p = 0.005$) and urban signage (38.7% vs. 15.2%, $p = 0.030$) more often to guide themselves during the city visit. Thus, there is an impact of the use of online search engines at the level of territoriality and wayfinding sub-dimensions. This

TABLE 3 Backpacker's spatiotemporal behavior: Online travel reviews versus online search engines with

Variables	Online travel review		p	Search engines online		p
	No (N = 67)	Yes (N = 15)		No (N = 51)	Yes (N = 31)	
Distance traveled (day visit) (km)	Md = 5.49 M = 18.22, SD = 45.77	Md = 5.17 M = 6.65, SD = 4.55	0.801[a]	Md = 5.13 M = 19.60, SD = 52.11	Md = 6.24 M = 10.35, SD = 9.62	0.228[a]
Day visit duration (min)	Md = 235.08 M = 302.18, SD = 226.47	Md = 257.58 M = 271.32, SD = 211.49	0.728[a]	Md = 201.88 M = 284.83, SD = 221.47	Md = 257.58 M = 315.78, SD = 227.46	0.433[a]
Time in motion (min)	Md = 94.38 M = 140.68, SD = 139.58	Md = 114.50 M = 108.87, SD = 59.49	0.976[a]	Md = 87.23 M = 128.49, SD = 115.69	Md = 114.50 M = 145.33, SD = 149.79	0.397[a]
Maximum dispersal from hostel (km)	Md = 1.56 M = 7.06, SD = 22.12	Md = 1.31, M = 1.68, SD = 1.63	0.166[a]	Md = 1.48 M = 8.31, SD = 25.24	Md = 1.55 M = 2.39, SD = 2.22	0.767[a]
Average speed (km/h)	Md = 1.91 M = 2.92, SD = 3.46	Md = 1.47 M = 2.46, SD = 2.31	0.553[a]	Md = 1.70, M = 3.03, SD = 3.87	Md = 1.98 M = 2.51, SD = 1.94	0.966[a]
Altitude variation (m)	Md = 83.00 M = 99.81, SD = 124.42	Md = 88.00 M = 80.93, SD = 21.61	0.947[a]	Md = 83.00 M = 104.75, SD = 141.02	Md = 88.00 M = 82.55, SD = 30.97	0.667[a]
Itinerary geometry						
Single point-to-point	9.0% (n = 6)	6.7% (n = 1)	0.631[b]	11.8% (n = 6)	3.2% (n = 1)	0.205[b]
Circular	10.4% (n = 7)	0.0% (n = 0)		11.8% (n = 6)	3.2% (n = 1)	
Complex	80.6% (n = 54)	93.3% (n = 14)		76.5% (n = 39)	93.5% (n = 29)	
Number of attractions visited	Md = 3.00 M = 3.79, SD = 1.74	Md = 4.00 M = 4.40, SD = 1.30	0.074[a]	Md = 3.00 M = 3.47, SD = 1.24	Md = 4.00 M = 4.61, SD = 2.04	**0.014**[a]
Number of activities engaged in	Md = 3.00 M = 2.94, SD = 0.95	Md = 3.00 M = 3.33, SD = 0.82	0.080[a]	Md = 3.00 M = 2.84, SD = 0.70	Md = 3.00 M = 3.29, SD = 1.19	**0.038**[a]
Disorientation						
Didn't get lost	87.1% (n = 54)	66.7% (n = 10)	0.116[b]	87.0% (n = 40)	77.4% (n = 24)	0.356[b]
Got lost	12.9% (n = 8)	33.3% (n = 5)		13.0% (n = 6)	22.6% (n = 7)	
Landmarks used to navigate						
Maps	67.7% (n = 42)	53.3% (n = 8)	0.369[b]	67.4% (n = 31)	61.3% (n = 19)	0.631[b]
City landscape landmarks	48.4% (n = 30)	80.0% (n = 12)	**0.042**[b]	41.3% (n = 19)	74.2% (n = 23)	**0.005**[b]
Smartphone app	37.1% (n = 23)	66.7% (n = 10)	**0.046**[b]	41.3% (n = 19)	45.2% (n = 14)	0.816[b]
Signposting	30.6% (n = 19)	0.0% (n = 0)	0.016[b]	15.2% (n = 7)	38.7% (n = 12)	**0.030**[b]
GPS (car/portable device)	17.7% (n = 11)	40.0% (n = 6)	0.084[b]	26.1% (n = 12)	16.1% (n = 5)	0.404[b]
Asking residents for information	17.7% (n = 11)	26.7% (n = 4)	0.474[b]	23.9% (n = 11)	12.9% (n = 4)	0.260[b]
Means of transport						
Walking	93.5% (n = 58)	100.0% (n = 15)	0.581[b]	91.3% (n = 42)	100.0% (n = 31)	0.144[b]
Public transport	22.6% (n = 14)	33.3% (n = 5)	0.505[b]	21.7% (n = 10)	29.0% (n = 9)	0.591[b]
Commercial/tourist transport	11.3% (n = 7)	13.3% (n = 2)	0.999[b]	10.9% (n = 5)	12.9% (n = 4)	0.999[b]
Rented car or own car	4.8% (n = 3)	0.0% (n = 0)	0.999[b]	2.2% (n = 1)	6.5% (n = 2)	0.561[b]

Note: Bold values represent the results with more significance level.
Abbreviations: M, mean; Md, median.
[a]Significance value of Mann-Whitney test.
[b]Significance value of Fisher exact test.
Source: Own elaboration.

TABLE 4 Spatiotemporal behavior: Offline information sources versus online information sources

Variables	Offline information sources			Online information sources		
	No ($n = 43$)	Yes ($n = 39$)	p	No ($n = 37$)	Yes ($n = 45$)	p
Distance traveled (day visit) (km)	Md = 5.23 M = 17.42, SD = 42.63	Md = 5.49 M = 14.66, SD = 40.95	0.978[a]	Md = 4.83 M = 8.08, SD = 8.26	Md = 6.2 M = 22.70, SD = 55.07	0.099[a]
Day visit duration (min)	Md = 265.00 M = 325.00, SD = 252.91	Md = 207.48 M = 265.15, SD = 182.33	0.486[a]	Md = 194.08 M = 237.93, SD = 173.37	Md = 288.95 M = 344.71, SD = 248.15	**0.048**[a]
Time in motion (min)	Md = 107.97 M = 154.69, SD = 157.73	Md = 94.38 M = 112.99, SD = 83.86	0.417[a]	Md = 77.78 M = 108.81, SD = 91.74	Md = 114.50 M = 156.28, SD = 150.68	**0.041**[a]
Maximum dispersal from hostel (km)	Md = 1.42 M = 6.84, SD = 21.15	Md = 1.66 M = 5.23, SD = 19.08	0.458[a]	Md = 1.44 M = 2.50, SD = 3.31	Md = 1.55 M = 9.01, SD = 26.72	0.384[a]
Average speed (km/h)	Md = 1.88 M = 2.86, SD = 3.23	Md = 1.70 M = 2.81, SD = 3.35	0.714[a]	Md = 1.84 M = 2.41, SD = 1.73	Md = 1.86 M = 3.19, SD = 4.12	0.834[a]
Altitude variation (m)	Md = 86.00 M = 94.33, SD = 111.88	Md = 85.00 M = 98.59, SD = 115.46	0.849[a]	Md = 77.00 M = 73.19, SD = 33.61	Md = 90.00 M = 115.40, SD = 147.39	**0.039**[a]
Itinerary geometry						
Single point-to-point	4.7% ($n = 2$)	12.8% ($n = 5$)	0.468[b]	13.5% ($n = 5$)	4.4% ($n = 2$)	**0.020**[b]
Circular	9.3% ($n = 4$)	7.7% ($n = 3$)		16.2% ($n = 6$)	2.2% ($n = 1$)	
Complex	86.0% ($n = 37$)	79.5% ($n = 31$)		70.3% ($n = 26$)	93.3% ($n = 42$)	
Day of stay						
First day	18.6% ($n = 8$)	20.5% ($n = 8$)	1.000[b]	21.6% ($n = 8$)	17.8% ($n = 8$)	0.408[b]
Middle day	65.1% ($n = 28$)	61.5% ($n = 24$)		67.6% ($n = 25$)	60.0% ($n = 27$)	
Last day	16.3% ($n = 7$)	17.9% ($n = 7$)		10.8% ($n = 4$)	22.2% ($n = 10$)	
Number of attractions visited	Md = 3.00 M = 3.88, SD = 1.79	Md = 4.00 M = 3.92, SD = 1.56	0.812[a]	Md = 3.00 M = 3.30, SD = 1.15	Md = 4.00 M = 4.40, SD = 1.88	**0.008**[a]
Number of activities engaged in	Md = 3.00 M = 3.00, SD = 0.79	Md = 3.00 M = 3.03, SD = 1.09	0.793[a]	Md = 3.00 M = 2.70, SD = 0.74	Md = 4.00 M = 3.67, SD = 1.01	**0.002**[a]
Disorientation						
Didn't get lost	86.8% ($n = 33$)	79.5% ($n = 31$)	0.545[b]	93.8% ($n = 30$)	75.6% ($n = 34$)	0.061[b]
Got lost	13.2% ($n = 5$)	20.5% ($n = 8$)		6.3% ($n = 2$)	24.4% ($n = 11$)	
Landmarks used to navigate						
Maps	57.9% ($n = 22$)	71.8% ($n = 28$)	0.238[b]	84.4% ($n = 27$)	51.1% ($n = 23$)	**0.003**[b]
City landscape landmarks	57.9% ($n = 22$)	51.3% ($n = 20$)	0.649[b]	31.3% ($n = 10$)	71.1% ($n = 32$)	**0.001**[b]
Smartphone app	44.7% ($n = 17$)	41.0% ($n = 16$)	0.820[b]	40.6% ($n = 13$)	44.4% ($n = 20$)	0.817[b]
Signposting	15.8% ($n = 6$)	33.3% ($n = 13$)	0.112[b]	21.9% ($n = 7$)	26.7% ($n = 12$)	0.790[b]
GPS (car/portable device)	31.6% ($n = 12$)	12.8% ($n = 5$)	0.058[b]	15.6% ($n = 5$)	26.7% ($n = 12$)	0.280[b]
Asking residents for information	28.9% ($n = 11$)	10.3% ($n = 4$)	**0.047**[b]	15.6% ($n = 5$)	22.2% ($n = 10$)	0.567[b]
Means of transport						
Walking	89.5% ($n = 34$)	100.0% ($n = 39$)	0.055[b]	93.8% ($n = 30$)	95.6% ($n = 43$)	1.000[b]
Public transport	15.8% ($n = 6$)	33.3% ($n = 13$)	0.112[b]	25.0% ($n = 8$)	24.4% ($n = 11$)	1.000[b]
Commercial/tourist transport	15.8% ($n = 6$)	7.7% ($n = 3$)	0.310[b]	6.3% ($n = 2$)	15.6% ($n = 7$)	0.291[b]
Rented car or own car	2.6% ($n = 1$)	5.1% ($n = 2$)	1.000[b]	3.1% ($n = 1$)	4.4% ($n = 2$)	1.000[b]

Note: Bold values represent the results with more significance level

Abbreviations: M, mean; Md, median.

[a]Significance value of Kruskal-Wallis.

[b]Significance value of Fisher exact test.

Source: Own elaboration.

situation can be justified by the large amount and diversity of information provided by search engines such as google.com when compared to online travel review sites (e.g., TripAdvisor), which can induce visitors to visit more attractions and perform more activities.

Regarding backpackers who used online travel reviews (Table 3), it was found that they also tend to visit a greater number of attractions ($p = 0.074$) and carried out more activities ($p = 0.080$). Those who consulted online travel reviews sites (e.g., TripAdvisor) about Porto, also used landmarks of the urban landscape more frequently (80.0% vs. 48.4%, $p = 0.042$). Smartphone apps (66.7% vs. 37.1%, $p = 0.046$) were also used to guide themselves around the city, which indicates that apps associated with GPS technology facilitate the discovery of the best routes to reach tourist attractions. Travel review apps like TripAdvisor have a map with the location of each attraction that gives the best route to get to the destination according to visitor location. That is in line with the use of GPS (40.0% vs. 17.7%,

TABLE 5 Use of travel guides (lonely planet, rough guide…) and backpackers' spatiotemporal behavior

	Travel guidebooks		
Variables	**No ($N = 57$)**	**Yes ($N = 25$)**	***p***
Distance traveled (day visit) (km)	Md = 5.49 M = 19.47, SD = 49.37	Md = 5.42 M = 8.42, SD = 8.22	0.590[a]
Day visit duration (min)	Md = 277.33 M = 329.84, SD = 240.80	Md = 194.08 M = 220.60, SD = 153.90	0.078[a]
Time in motion (min)	Md = 107.97 M = 152.54, SD = 147.13	Md = 88.08 M = 94.55, SD = 56.67	0.148[a]
Maximum dispersal from hostel (km)	Md = 1.48 M = 7.71, SD = 23.93	Md = 1.56 M = 2.34, SD = 2.18	0.484[a]
Average speed (km/h)	Md = 1.84 M = 2.90, SD = 3.73	Md = 2.15 M = 2.70, SD = 1.88	0.233[a]
Altitude variation (m)	Md = 88.00 M = 105.56, SD = 133.06	Md = 77.00 M = 75.36, SD = 32.49	0.133[a]
Itinerary geometry			
Single point-to-point	3.5% ($n = 2$)	20.0% ($n = 5$)	0.061[b]
Circular	8.8% ($n = 5$)	8.0% ($n = 2$)	
Complex	87.7% ($n = 50$)	72.0% ($n = 18$)	
Number of attractions visited	Md = 3.00 M = 3.77, SD = 1.70	Md = 4.00 M = 4.20, SD = 1.61	0.179[a]
Number of activities engaged in	Md = 3.00 M = 2.98, SD = 0.88	Md = 3.00 M = 3.08, SD = 1.08	0.631[a]
Disorientation			
Didn't get lost	82.7% ($n = 43$)	84.0% ($n = 21$)	0.999[b]
Got lost	17.3% ($n = 9$)	16.0% ($n = 4$)	
Landmarks used to navigate			
Maps	57.7% ($n = 30$)	80.0% ($n = 20$)	0.075[b]
City landscape landmarks	59.6% ($n = 31$)	44.0% ($n = 11$)	0.228[b]
Smartphone app	46.2% ($n = 24$)	36.0% ($n = 9$)	0.466[b]
Signposting	15.4% ($n = 8$)	44.0% ($n = 11$)	0.010[b]
GPS (car/portable device)	25.0% ($n = 13$)	16.0% ($n = 4$)	0.558[b]
Requests for info. to residents	23.1% ($n = 12$)	12.0% ($n = 3$)	0.360[b]
Means of transport			
Walking	92.3% ($n = 48$)	100.0% ($n = 25$)	0.298[b]
Public transport	19.2% ($n = 10$)	36.0% ($n = 9$)	0.158[b]
Commercial/tourist transport	13.5% ($n = 7$)	8.0% ($n = 2$)	0.710[b]
Rented car or your own	1.9% ($n = 1$)	8.0% ($n = 2$)	0.245[b]

Abbreviations: M, mean; Md, median.
[a]Significance value of Mann-Whitney test.
[b]Significance value of Fisher exact test.
Source: Own elaboration.

$p = 0.084$), which indicates that those who used online travel reviews sites during the visit tended to use GPS more to guide themselves.

4.4 | Offline versus online information sources

The use of online information sources available seems to have an important influence on the space–time behavior of backpackers and their mobility. Looking at Table 4, backpackers who used online information sources during the visit made a day visit with a longer duration ($p = 0.048$), with more time in motion ($p = 0.041$) and made routes with greater altimetric differences ($p = 0.039$). They also visited more attractions ($p = 0.008$) and performed more activities ($p = 0.002$) than backpackers who did not seek information online. Furthermore, those who used more online information sources also made more complex routes ($p = 0.020$) and used more maps ($p = 0.003$) and landmarks in the urban landscape ($p = 0.001$) to guide themselves during the visit to Porto.

The research of online information about Porto, carried out during the visit, proved to have a great influence on the spatiotemporal behavior of the backpackers, namely in terms of the linearity and intensity of the visit. Wayfinding, locomotion, and territoriality were sub-dimensions that were also influenced using information sources available on the internet. Therefore, it can be concluded that the information sources used during the visit which had the greatest impact on backpackers' mobility were online information sources, namely online search engines (i.e., Google) also shown in Table 2.

Travel guidebooks are enriched with maps of destinations, but due to their scale, there is a lack of many details that can be filled in by consulting the maps provided by the authorities responsible for the tourist management of the destination and which are available free of charge in all accommodation. Regarding the use of the popular travel guidebooks (i.e., Lonely Planet, Rough Guide, among others), as shown in Table 5, associations were found close to the 5% statistical level in the duration of the visit ($p = 0.078$). As such, backpackers who used the city's well-known travel guides tend to make shorter journeys. In terms of wayfinding, they also tend to use the well-known tourist maps of the city more (80.0% vs. 57.7%, $p = 0.075$) and urban signage (44.0% vs. 15.4%, $p = 0.010$). As such, it can be concluded that the use of travel guidebooks was also complemented using existing signposting in the city.

5 | DISCUSSION

The backpacker segment is mostly made up of younger tourists who organize their visit independently, which helps explain why new technologies play a very important role in the preparation of backpackers' trips and even during visits to a particular destination. After identifying the main sources of information used by backpackers during their visit to Porto, Portugal, the results point to several particularities.

The importance of information obtained through the well-known WOM with friends and/or with family members stands out, although generically other travelers play the most important role vis-à-vis family and friends (Iaquinto, 2012; Pearce et al., 2009; Richards & Wilson, 2004a).

The use of online information sources, namely online search engines and accommodation booking websites and accommodation websites is in line with previous research (Pearce et al., 2009; Richards & Wilson, 2004b), which refers to young backpackers as being "information-intensive," emphasizing the search for a wide variety of information before traveling.

Backpackers ignore business information sources, with special attention to the "Porto Discount Card" (87.8%), retail travel agent (85.4%), or travel exhibitions/events (82.9%). Offline information sources like articles in magazines and tour brochures were also ignored with 74.4% and 59.8% of participants not using them, respectively. As independent tourists, backpackers organize their own trip looking for the lowest prices and avoiding intermediaries. This situation can also explain the reduced use of some online information sources such as online student/backpacker travel agencies and government tourism websites. All stakeholders involved with backpacker tourism should therefore focus their marketing and advertising strategy on online information sources, with special emphasis on online search engines.

Since the use of smartphones is widespread in Western countries, the results are in line with those of Kang (2016), who refers to the role and importance of information searches carried out using smartphones in relation to spatiotemporal restrictions of tourists. As such, it is very important to consider that on a multi-destination trip, as tourists arrive at a new destination, they have to do frequent information searches, which is important for DMO managers and public decision makers.

The differences between offline and online information sources are well justified as backpackers are known for using the internet to plan their trips and for relying heavily on smartphones for online information queries.

As WOM information sources are widely used by backpackers (Figure 1), both before and during the visit, local stakeholders should explore this situation. Those responsible for managing the DMOs and the managers of small and medium-sized companies operating in this market segment must invest in improving the conditions of the visit to foster a positive flow of information among travelers to promote high levels of satisfaction. Furthermore, it is worth mentioning that during the day of the visit, the information provided by other travelers was the most used by backpackers, which needs to be considered as an efficient way to promote the destination or local tourism companies.

6 | CONCLUSIONS, CONTRIBUTIONS, AND LIMITATIONS

By analyzing the data obtained through the application of a questionnaire and the tracking performed with a free GPS app, it was found that the information sources consulted by backpacker tourists influence their spatiotemporal behavior during a day of visiting an urban destination.

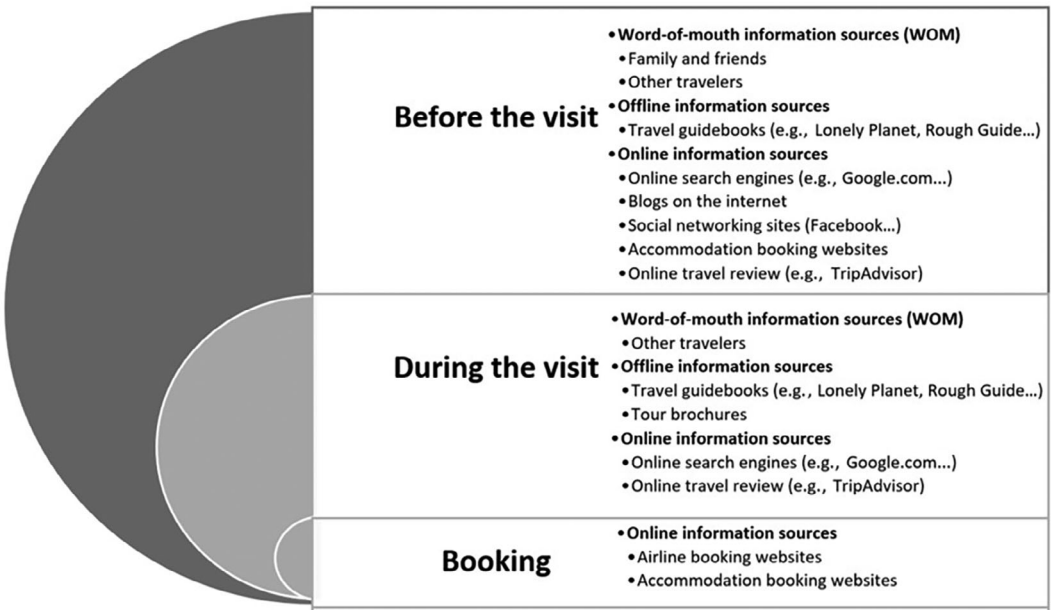

FIGURE 1 Information sources most used

Regarding research question 1, it can be concluded that within online information sources, online search engines are the most important sources used by backpackers. However, the importance of WOM information sources, namely family and friends should not be underestimated, as they play a very important role. Business information sources as well as other offline information sources are the least important. While it can be argued that the intensive use of the internet and the sociodemographic characteristics of the backpackers favor the search for online information during visits at the destination, it is possible to argue that the information source is different before and during the visit and when booking.

Airline booking websites and accommodation booking websites are very important while booking. Online search engines and accommodation booking websites are important online information sources before the visit; however, WOM from other travelers and from family and friends are important information sources that cannot be forgotten before the visit. Finally, during the visit, online search engines as well as WOM from other travelers need to be accounted for.

While travel guidebooks are (still) important sources of information before and during the visit, they are no match when compared with online search engines, due the versatility and the readiness and accessibility of online information which backpackers have access to nowadays.

Regarding research question 2, the types of information sources used by backpackers that influence their spatiotemporal behavior are online travel sources, namely search engines, accommodation booking websites, blogs on the internet and online travel reviews, as they have the greatest impact on backpackers' mobility.

Finally, regarding research question 3, it can be argued that despite the importance of family and friends, WOM from other travelers is very important both during and before the visit.

Despite its exploratory nature, this study demonstrates that backpackers who did not use offline information sources tend to request more information from residents during their day visiting the city and that those who used more popular travel guidebooks (i.e., Lonely Planet, Rough Guide, among others) used urban signage more often to guide themselves. The importance of online information sources is in line with the literature, showing that backpackers who use internet search engines (i.e., Google) as an information source, visit more attractions, perform more activities, and use landmarks in the urban landscape and urban signs more frequently to guide themselves during the visit to the city. Furthermore, those who use online travel reviews during the visit use landmarks of the urban landscape more frequently, use more smartphone apps and GPS, and use less urban signage.

Backpackers who use online information sources during the visit experience the destination in a more intense way: they make longer visits with more time in motion and make routes with more differences in altitude. They also visit more attractions and perform more activities than backpackers who did not seek information online. They also make more complex routes and use more maps and landmarks in the urban landscape to guide themselves. This result may be due to the large amount and diversity of tourist information available online that seems to lead backpackers to disperse and to search for more attractions and activities.

Backpackers who consult other travelers (WOM information) tend to use smartphone apps more often to guide themselves during the visit and use public transport less frequently. Although the sample size is not very large, this result may indicate that the use of public transport is not very recommended or even discouraged by other travelers, suggesting the need for a more systematic analysis in future studies.

This exploratory study makes important contributions to the literature as it identifies the main information sources used by tourists in the backpacker segment, before and during the visit to an urban destination. This information can be used by destination managers and local stakeholders to attract tourists from this segment, making their marketing strategy more efficient. It is one of the first studies to successfully use a free and open-access GPS app to track the movements of tourists, demonstrating that smartphones are a powerful and efficient data collection tool in the tourism field. The crossing of georeferenced information with data collected by questionnaires, namely the typology of information sources used by backpackers, allows a topic of analysis to be explored that has not yet been thoroughly investigated.

6.1 | Contributions

The inclusion of a set of variables related to information sources has been shown to have a great impact on the spatiotemporal behavior of this segment of tourists. As they have not yet been examined in detail in the scientific literature, and despite their exploratory nature, the analysis of these variables has given a theoretical and methodological contribution to the topic of the spatiotemporal behavior of tourists.

In addition to the importance of online information sources in the spatiotemporal behavior of backpackers, the results of the questionnaire also highlight the fact that this market segment ignores business information sources, with especially the "Porto Discount Card," retail travel agents or travel exhibitions/events. As independent tourists, backpackers tend to organize their own trip looking for the lowest prices and avoid intermediaries. Smartphone applications aimed at tracking movements, such as the one used in this study, have been identified as an innovative tracking technique and demonstrated to be an effective, inexpensive, and easy-to-use measurement and georeferencing tool. Although it is an invasive technique which limits participation by tourists (Miyasaka et al., 2018), it is already beginning to be successfully used especially when there are generous counterparts for tourists, such as discount vouchers, equipment offers (smartphones) or even cash.

6.2 | Limitations

The number of backpackers who agreed to track their movements through a GPS application, during a day visiting the city was not very large, so the results obtained with the analysis of the tracked data should be interpreted parsimoniously. However, it is important to note that the sample obtained about tracking data is larger than the screenings obtained in other studies, as stated before. The screenings comprise only one day of the visit and not the entire stay of the tourists, so the results obtained must be interpreted considering this situation. The results obtained show the need to expand the analysis of the impact of information sources on the spatiotemporal behavior of tourists, with more robust samples. Despite the limited sample size, the results presented strengthen and extend previous knowledge on this topic, which deserves more attention in future studies.

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DATA AVAILABILITY STATEMENT

The authors confirm that the data supporting the findings of this study are available within the article [and/or] its supplementary materials.

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