ORIGINAL ARTICLE

Gagan Deep Sharma
Szechenyi Istvan University, Hungary
University School of Management Studies, Guru Gobind Singh Indraprastha University, India
 orcid.org/0000-0001-5379-0761

Agnieszka Stanimir
Wroclaw University of Economics and Business, Poland
 orcid.org/0000-0002-9206-9210

Klaudia Przybysz
Wroclaw University of Economics and Business, Poland
 orcid.org/0000-0001-7036-7439

Elżbieta Roszko-Wójtowicz
University of Lodz, Poland
 orcid.org/0000-0001-9337-7218

How do European seniors perceive and implement the postulates of sustainable tourism?

Abstract

Research background: Tourism is one of the fastest-growing sectors of the economy, thus the implementation of sustainable solutions in tourism ought to be a worldwide adopted requirement. Tourists should seek to pursue sustainable development goals during their travels.

Given the aging population, it is important to encourage seniors to practice sustainable tourism and tailor offerings to their needs.

Purpose of the article: Our study aims to identify the readiness of seniors within the European Union to travel in line with the sustainable development goals.

Methods: Representative data from Flash Eurobarometer 499 were used in the study presented in the article. Correspondence analysis, which is a multidimensional statistical method that facilitates the search for relationships between multiple characteristics of respondents, was used in the course of our study.

Findings & value added: We conclude that the offer of future tourist solutions must be diverse, because the perception of tourism is very different among seniors with varying ages, genders, levels of education, and places of residence. Only small groups of seniors are not ready to adopt sustainable tourism, but many European tourists intend to continue using sustainable solutions and introduce new ones into their tourism. The greatest determination to apply sustainable solutions was observed among German seniors, especially in the use of green transportation.

Introduction

Many economies are currently facing serious global issues. The problems most often addressed in contemporary scientific and political discourse include halting climate change, aging populations and combating poverty. Although these problems are called global, they need to be solved for each unit of society. Thus, in 2015, 195 countries signed the Sustainable Development Goals (SDGs) of the Agenda 2030 (United Nations, 2015). The Agenda's seventeen goals are aimed primarily at improving the lives of people in each country and implementing economic change, with a particular focus on reducing climate change and protecting the environment by 2030. These changes intend to decrease poverty and hunger, fight inequality and injustice, ensure economic growth, promote technological progress in harmony with nature, and protect the planet from degradation and climate change. Due to the extent of their influence on the planet, prosperity, peace and partnership, these goals are called the people's goals. The SDGs are designed to prevent further rapid, unsustainable economic growth whereby the environment and human well-being could be jeopardized (Almeida-Silva *et al.*, 2022; Cox, 2020; Leal Filho *et al.*, 2020). Mensah (2019) points out that sustainability efforts are inter- and intra-generational in nature.

Sustainable tourism (ST) is "tourism that takes full account of its current and future economic, social and environmental impacts, addressing the needs of visitors, the industry, the environment and host communities"

(World Tourism Organization and United Nations Development Programme [WTO and UNDP], 2017). In our study, we focused on SDG-compliant tourism with particular attention to issues related to SDG awareness and the attention paid by senior tourists to implementation of the SDGs. The pre-pandemic growth of the tourism industry had a significant impact on the labor, goods and services markets. In 2019, the Travel & Tourism sector contributed 10.4% to global GDP, in 2015 — 10%, and in 2013 — 9% (Jus & Misrahi, 2021; WTO and UNDP, 2017). The Covid-19 pandemic significantly slowed growth of the tourist industry (Bučar *et al.*, 2022; Demeter *et al.*, 2023; Gössling *et al.*, 2021; Kassem *et al.*, 2021). In 2022, the Travel & Tourism sector contributed 7.6% to global GDP (World Travel & Tourism Council [WTTC], 2023). Unexpected economic events, natural disasters, infectious diseases and other dramatic events have strongly affected tourism, but this sector is recovering very quickly (Bučar *et al.*, 2022).

The considerations presented in the article combine the SDGs with senior tourism. The pillars of the SDGs are environment, economy and society. The same pillars, among which feedback must occur, are also observed in tourism. However, focusing on the social and psychological effects of tourism and aging, it is worth noting the assumptions of active aging.

The concept of Active Aging (AA) sensitizes society, institutions and organizations to the need to broadly adapt products and services to current and future seniors. Population predictions suggest that in 2050, the share of elderly people (65 years or over) will be 52% of the working-age population (15 to 64 years) and 29.5% of the total population (Eurostat, 2023). In 2100, these shares will increase to 57% and 31.3%, respectively. These numbers underscore the importance of AA protocols.

The Active Aging report (World Health Organization, 2002) introduces three pillars of AA: health, safety and belonging to society. The combination of these three fundamental aspects of seniors' lives allows for an adaptive approach to aging (Patterson *et al.*, 2021; Przybysz & Stanimir, 2023). Observing AA in these areas correlates with understanding the quality of life (QoL) as a concept of well-being and the positive functioning of individuals in society (Eurofound, 2017; Kiuru & Valokivi, 2022). Since, according to the assumptions of AA, aging should be perceived as a normal process of human development (Przybysz & Stanimir, 2022), efforts should be made to maintain seniors' interest in tourism or to generate such interest. Tourism significantly contributes to defining and developing these determinants, greatly influencing seniors as a part of society. Encouraging sen-

iors to participate in tourism impacts older people's social and physical activity both before, during and after trips (Fan, 2023; Streimikiene *et al*., 2021), while participation in both one-day and several-day trips, as well as longer stays, mobilizes seniors to take action and change their usual everyday routines (Hu *et al*., 2023; Qiao *et al*., 2022). These routines contribute to isolation in the life of seniors, which may lead to limitations in their functioning and depressive changes (Cohen *et al*., 2014; Hu *et al*., 2023). Making tourist economies friendly to seniors requires a socio-economic refashioning that would influence the functioning of the tourism industry as a whole.

While tourism may contribute to positive changes, such as economic growth, environmental protection and poverty alleviation, shifts in this sector of the economy may also have adverse effects, such as climate change mainly due to the emission of greenhouse gases (GHGs), and also be the cause of negative economic phenomena (Gössling *et al*., 2021; Hjalager, 2000). The WTO and UNDP report (2017) describes how the tourism sector is related to implementing all seventeen SDGs, though the literature most often mentions the link between tourism and two of the SDGs: the eighth goal (Decent Work and Economic Growth) and the twelfth (Responsible Consumption and Production) (World Tourism Organization, 2017). The implementation of these goals focuses on activities undertaken by the tourism sector and by the individual tourist. If Objective 8 is not achieved, employment opportunities in tourism will decrease, resulting in worsening poverty and rising inequality. Failure to achieve Objective 12 will result in excessive use of natural resources in implementing economic growth and, thus, a more significant global material footprint, wherein environmental degradation, improper waste management, and food waste will affect air, water, and soil pollution. Not meeting the goals directly related to human existence [i.e., goal 1 (end of poverty), 3 (good health and well-being for people), and 5 (gender equality)] reduces the likelihood of improving the QoL for seniors and the positive effects tourism has on them (Cox, 2020). To develop sustainably, the tourism sector should react very quickly to climate change, and reduce its contribution to GHGs (World Tourism Organization and United Nations Environment Programme [WTO and UNEP], 2008). In addition, the implementation of the 17 SDGs will only occur if sustainable development is the joint responsibility of tourists as users of tourist goods (including natural resources), the tourism sector as tourism organizers, and governments as authorities supervising the im-

plementation of the SDG strategy (Han, 2021; WTO and UNDP, 2017). Therefore, multilateral action to preserve natural resources and artistic and cultural heritage in tourist regions is needed to ensure the implementation of the SDGs (de Andreis & Carioni, 2022; Streimikiene *et al.*, 2021).

The aim of our study was to identify the readiness of seniors to introduce modifications to their tourism needs in line with the SDGs. Thus, formulated aim was pursued by conducting international comparisons within the European Union. Taking into account the outlined issues related to sustainable tourism and the attitudes of seniors in this respect, we posed the following research questions (RQs):

RQ1: *Are seniors ready for sustainable tourism solutions?*

RQ2: *How ready are seniors to introduce sustainable solutions in their consumption of tourism?*

RQ3: *Are all senior tourists ready to make changes towards sustainable tour-ism activity (and are there any differences in readiness regional or demo-graphic)?*

RQ4: *Which sustainable tourism activities are most often chosen by seniors?*

This line of research is important for several reasons. Firstly, it is imperative to learn if seniors are aware of the goals of sustainable tourism. Another critical aspect of the study is to see if seniors subordinate their tourism-related choices to the goals of sustainability. The last element is the possibility of comparing the behavior of senior tourists across the EU in terms of achieving the SDGs. This access to information about the SDGs and understanding of their goals is crucial in the era of digitization of information flows. Seniors often do not use the Internet, and their sources of information are radio, television and magazines. Information on the SDGs at the EU, national and regional levels is published as widely as possible on the Internet. The literature review presented in the article shows what aspects current research on senior tourism focuses on. The mainstream analysis of senior tourism in terms of sustainability is concerned with the implementation of sustainable tourism for the social inclusion of seniors. Previous research suggests that seniors' problems should mainly be solved locally, as cultural context matters. While it is hard to disagree with this, international comparative studies provide equally important conclusions.

Research focused only on local senior tourists does not take advantage of the knowledge and experience concerning ST that seniors have gained from traveling abroad. The aspect of the relationship between sustainable tourism and seniors' QoL is very much emphasized in the literature. The importance of this relationship is indisputable, but assessable by seniors only if they are able to define the SDGs and the resulting impact on their tourism-related needs. Currently, there is a lack of research that takes into account the subjective opinions of seniors in relation to their use of the SDGs in tourism in international cross-sections. In our study, it is the senior citizen who is the central reference point for the realization of sustainable tourism goals. We explore how, from a senior's point of view, these goals can be realized and whether seniors wish to be involved in their implementation. This article thus addresses an identified research gap.

To obtain answers to the research questions, correspondence analysis was used. The choice of method was due to the nature of the variables. We were able to present non-metric data reflecting subjective opinions of seniors on ST in multidimensional contingency tables. This form of analysis allowed for a very detailed assessment of the readiness of European seniors to implement sustainable solutions in the realization of their travel needs.

The article consists of six consecutive sections. The next part after the Introduction is the Literature Review. This section presents the requirements of sustainable tourism, outlines the importance of tourism for seniors, and reviews the state of current research on the topic. The following section describes the data used and the research methodology. In the next section, the results of the analysis are presented. Finally, the article presents a discussion and conclusions with suggestions for further analysis.

Literature review

Much attention in the literature has been paid to the rationale for ST, the collective actions of all beneficiaries of tourism, and the impact of ST on its participants and their lives. Thus, it can be assumed, as in Choi and Sirakaya (2005) or Antunes *et al*. (2023), that ST is an alternative form of mass tourism that improves the QoL of the host community, while simultaneously providing a proper cognitive experience for tourists. ST focuses on the trade-off between economic costs and benefits, as well as activities that do not interfere with the quality of the natural environment, aiming instead

at the conservation and preservation of all resources (Almeida-Silva *et al.*, 2022; Jasrotia *et al.*, 2023).

Sustainable development (SD) solutions cannot be implemented once. Solutions that permit ST cannot be implemented once; rather, they require constant monitoring and modernization (Han, 2021). For tourism to follow SD principles, both the tourist business sector and the tourists themselves must be involved (WTO and UNEP, 2008). Gautam (2023) and Antunes *et al.* (2023) indicate to what extent ST impacts the local community. This is also exemplified by the research conducted by Apak and Gürbüz (2023), who examined the multi-directional impact of one area of ST-local food. The authors point out that consumption of local food is one of the most important tourism experiences, influences agricultural ecology and the environment, and builds the destination's image. Jasrotia *et al.* (2023) conducted a discussion on the impact of economic, environmental, socio-cultural, and institutional sustainability as tourism factors affecting tourist satisfaction. ST thus emerges as a multi-faceted concept (Font *et al.*, 2023; Kollmuss & Agyeman, 2002) dependent on the complexities of shaping pro-ecological behavior. Using one general solution will not result in a unilateral ecological improvement (Kollmuss & Agyeman, 2002).

To promote ST, tourism industry entities must provide information on sustainable values for tourists, who, in turn, will be able to make responsible choices and transfer sustainable growth solutions into everyday life (Almeida-Silva *et al.*, 2022; WTO and UNDP, 2017). SD in tourism must include activities that continually change in response to new technologies, the consumption aspects of tourism, and changing lifestyles (Font *et al.*, 2023; Losada *et al.*, 2019; Streimikiene *et al.*, 2021). Therefore, knowledge-sharing is particularly important for operators of tourist trips offered to the elderly, who less often access the widely available wealth of information available on the Internet.

Tourism, QoL and life satisfaction are other trends currently strongly emphasized in publications (Alén *et al.*, 2012; Hrnjić *et al.*, 2016; Liew *et al.*, 2021; Przybysz & Stanimir, 2023; Ridderstaat, 2023; Steptoe & Zaninotto, 2020). Traveling and resulting experiences significantly affect the positive perception of life. This, in turn, translates into QoL (Hu *et al.*, 2023; Patterson *et al.*, 2021). This viewpoint is further substantiated by the considerations of Ridderstaat (2023). The author emphasizes the need to observe the direct and indirect effects of tourism. It will undoubtedly benefit senior citizens to nurture the positive effects of tourism and mitigate the negative

ones. The current tourist expectations of individuals are rapidly changing. Tourism is no longer just a synonym for escape and relaxation, but rather represents gaining new experiences and discovering new emotions (de Andreis & Carioni, 2022; Kyriakou & Belias, 2017). In senior tourism, health and financial situation are essential factors that influence the decision to travel (Hwang & Lee, 2019; Nicolau *et al.*, 2020; Pak, 2020; Przybysz & Stanimir, 2023), which are also related to or affect standard of living. Therefore, these factors are constantly intertwined. Adding pro-environmental behavior to them can be a significant burden that leads to the decision not to participate in tourism. It is important to point here to a study focused on the health-promoting value of sustainable tourism. Zhang *et al.* (2021) noted the positive impact of the landscape on the recovery of seniors participating in seasonal health tourism. And Chen *et al.* (2023) found that forest ecological landscapes offered significant benefits to the elderly in the context of tourism. When discussing sustainability in the area of tourism, it is impossible to ignore social tourism (Panasiuk & Wszendybył-Skulska, 2021).

Another aspect raised in the literature, and also related to our consideration of ST implementation by seniors, is the negative impact of tourism on the environment.

Skillful introduction of the SDGs into senior tourism, however, will benefit travelers in the long run. The main goals of tourism should include the possibility of sustainable recreation and relaxation, emphasizing that tourism should rebuild strength and increase vitality. Chilufya *et al.* (2019) indicate that tourists strive to use sustainable solutions during their trips, but only if these have a minimal negative impact on their everyday lives. In constructing a tourist offer in line with the implementation of the SDGs, tourism professionals must use the emotional element of a journey that both impacts tourists' memory (Cohen *et al.*, 2014; de Andreis & Carioni, 2022; Loureiro *et al.*, 2022; Patterson *et al.*, 2021) and brings them to the realization that taking care of the environment is a moral duty (Bolderdijk *et al.*, 2013; Han, 2021; Hardy *et al.*, 2002). It is natural to wish to explore the link between ST and QoL (Ridderstaat, 2023).

The introduction of ST aims to limit the negative environmental effects of unsustainable tourism and the emission of GHGs, as the tourism sector is particularly dependent on the climate. Tourists often depart from pro-ecological activities while on vacation because they associate them with giving up freedom and experiencing difficulties in participating in recrea-

tion. Only people who are deeply convinced of the rightness of the SDGs completely subconsciously pursue these goals, regardless of the situation in which they find themselves. Chilufya *et al.* (2019) state that although tourists know the SDGs, they do not always use them daily. Tourists who implement the SDGs can choose environmentally appropriate infrastructure, certified accommodation, local or organic food and low-carbon means of transport (Larsen & Guiver, 2013). These activities are associated with choosing not to visit certain places, increasing the cost of trips, and considering these solutions as luxury goods. This cost aspect is of great importance for senior tourists because financial worry is the most common reason why people aged 65 and over do not participate in tourism (Przybysz & Stanimir, 2022, 2023).

As maximizing motivation and identifying opportunities are essential in identifying and guiding behavior (Loureiro *et al.*, 2022), research efforts must combine motivation, lifestyle, life satisfaction, and demographic indicators, such as gender and level of education (Faranda & Schmidt, 2000; Quan *et al.*, 2022; Streimikiene *et al.*, 2021). A broad range of analysis is proposed by Mendes *et al.* (2022). In their study, they described the relationship between the well-being of senior tourists and the following five measurable elements: Positive Emotion, Engagement, Relationships, Meaning, and Accomplishment (PERMA). According to seniors, tourism affects physical and mental health. Similar conclusions were reached by Hu *et al.* (2023) based on a bibliographic study of sustainable tourism for seniors. Studies conducted by Hajra and Aggarwal (2023) and Sien Leong *et al.* (2023) identified the converging factors attracting senior tourists: familiarity and friendliness of the destination, as well as safety and health care at the destination. Seniors' tourism behavior and decisions are influenced by a number of factors and life events (Huber *et al.*, 2018). This reference to life and travel experiences can be analyzed in other ways as well, taking into account tourists' engagement, perceived travel value and satisfaction, satisfaction derived from leisure time, QoL, and intention to travel again (Kim *et al.*, 2015). Despite numerous studies in this area, Mihalič (2023) points out that it is necessary to establish a detailed framework for the study of QoL and ST to properly determine their interaction.

Changing tourist habits is very difficult, as, despite the many benefits that the implementation of the SDGs in tourism may bring now, it will mainly have an impact on the next generations. Due to emotional, financial, and temporary factors, tourists may be reluctant to change their habits.

When making choices, tourists mainly make assessments based on economic self-interest, which they are reluctant to change unless they notice additional benefits from introducing sustainable solutions (Bolderdijk *et al.*, 2013). Efforts towards ST thus derive from the tourists' feelings and moral obligation toward environmental conservation (Han, 2021; Wu *et al.*, 2021). An environmentally-friendly social atmosphere is conducive to persuading social groups to implement the SDGs.

Reviewing the literature, it can be seen that most of the articles on senior tourism in terms of SD address the topic from the perspective of implementing sustainable tourism for the social inclusion of seniors. Our contribution to this research area fills the gap created by treating tourism as a tool to achieve sustainable goals through the social inclusion of seniors and the undoubted benefits of doing so. In our study, it is the senior citizen who is the central reference point for the realization of sustainable tourism goals. We study how, from a senior's point of view, these goals can be realized and whether seniors wish to be involved in their implementation. This approach allows us to study the attitudes of seniors, which in turn enables forecasting further directions for sustainable tourism activities.

In the study conducted, due to the measurement scale of the analyzed variables, we used correspondence analysis. In the literature, related methods, i.e. exploratory or confirmatory factor analysis, are often used in ST analyses (Hajra & Aggarwal, 2023; Mendes *et al.*, 2022; Otoo *et al.*, 2020).

Data and method

To answer the research questions (RQ1–RQ4), we surveyed EU citizens aged 65 years or above. In 2021, a Flash Eurobarometer 499 study was conducted on the topic of tourism. The questions posed in the questionnaire correspond to the scope of our research. The advantage of the Eurobarometer database is the correct selection of a representative sample and the possibility of using post-stratification weighting. Between the 18th and 28th of October 2021, 379 697 871 citizens of the 27 EU Member States aged 15 years and over took part in Computer-Assisted Telephone Interviews (CATI). The technical aspects of sample collection are described in detail in the final report published by the European Commission (2022b). In total, 4,842 people aged 65 and over participated in the study. This sample of individuals was consistent with the purpose of our research. The sample

size is sufficient for this study, and for the method used in the analysis. Sample characteristics are summarized in Table 1. Around 57% of the total respondents were female. Most of the respondents belonged to the group of younger seniors (66%). The vast majority of the seniors were already retired (83%). Most respondents were from small or medium-sized towns (38%), and a comparable number were from rural areas and large cities (30%, 32%).

The following question was used from the Flash Eurobarometer questionnaire: Are you prepared to change your travel and tourism habits to be more sustainable? (Q5 – original numbering). Respondents could indicate the way they could do this, including: pay more to protect the natural environment (1), paying more to the benefit of the local community (2), take holidays outside of the high tourist season (3), travel to less visited destinations (4), contribute to carbon-offsetting activities (5), consume locally sourced products on holiday (6), choose transport options based on ecological impact (7), reduce waste while on holiday (8), reduce water usage on holiday (9), I am not prepared to change my habits (10), something else (11), don't know (12).

The study used correspondence analysis (CA), a versatile method that can be used when there are nominal and ordinal variables in the data set. Metric variables converted to non-metric variables can also be used in the study. Correspondence analysis is used in many areas of research, including socio-economic (Kos-Łabędowicz & Trzęsiok, 2021; Peters & Roose, 2023; Przybysz *et al*., 2021), and environmental protection issues (Bąk *et al*., 2019), behavior of individuals (Ezzedine *et al*., 2023; Jagoda *et al*., 2023; Przybysz & Stanimir, 2022; Kiba-Janiak *et al*., 2022).

The described dataset contains only non-metric variables. CA enables the graphical presentation of the results, which is a significant advantage for the understanding of the results. CA belongs to the family of methods based on SVD (singular value decomposition), and uses the contingency table in the basic approach. We used the multiway contingency table in our analysis as this matrix enables the cross-classification of many variables (Andersen, 1997; Jobson, 1992). Since there are more than two variables in the multiway contingency table, forming layers was necessary. Such a table is crucial when checking the relationships of one variable's categories with combinations of categories of other variables. An example of multiway contingency table is provided in Table 2.

The graphical presentation of the results of the CA in the multiway contingency table describing the relationships of the categories of the analyzed variables is carried out through singular value decomposition (SVD). During CA, it is necessary to determine the coordinates of the categories of the analyzed variables. This procedure is described in detail in the books by Greenacre (1984, 2010). To calculate the categories coordinates, defining a correspondence matrix based on the contingency table is necessary (1):

$$\mathbf{A} = \mathbf{D}_r^{-1/2}(\mathbf{P} - \mathbf{r}\mathbf{c}^{\mathrm{T}})\mathbf{D}_c^{-1/2} \qquad (1)$$

where:

$\mathbf{D}_r = [p_{i.}]$ ($\mathbf{D}_c = [p_{.j}]$) diagonal matrix of row (column) masses in multiway contingency table;

$\mathbf{P}$ matrix of observed proportion $P = [p_{ij}] = \left[\frac{n_{ij}}{n}\right]$,

n_{ij} the frequency in the *i*-th row and *j*-th column.

The principal coordinates of the rows and columns are calculated using the formula (2, 3):

$$\mathbf{F} = \mathbf{D}_r^{-1/2}\mathbf{U} \qquad (2)$$

$$\mathbf{G} = \mathbf{D}_c^{-1/2}\mathbf{V}\mathbf{\Gamma} \qquad (3)$$

where:

$\mathbf{\Lambda}, \mathbf{U}, \mathbf{V}$ result from the singular value decomposition of $\mathbf{A}$ multiway contingency matrix ($\mathbf{A} = \mathbf{U}\mathbf{\Lambda}\mathbf{V}^{\mathrm{T}}$), and $\mathbf{\Gamma}^2 = \mathbf{\Lambda}, \mathbf{\Lambda} = [\lambda_k]$.

The key concept in any variant of CA is total inertia. It is the sum of the squared singular values (principal inertias) determined during the SVD: $\lambda = \sum_{k=1}^{K} \lambda_k = \sum_{k=1}^{K} \gamma_k^2$. The presentation of the relations of the variable categories given in the multiway contingency table can be performed in the K-dimensional space, where $K = min\,(r-1; c-1)$, and $r\,(c)$ is the number of rows (columns) of the matrix. When there are many categories of variables, typically designates a very large space and, therefore a projection into a 2- or 3-dimensional space. Principal inertias in descending order are responsible for creating one-, two-, and three-dimensional up to K-dimensional space, respectively. The principal inertia number is equal to K. The cumulative values of the shared principal inertias in total inertia

determine the degree of mapping of the actual relationships between the categories sequentially in a one- to K-dimensional space.

Results

Our study determined whether senior tourists are ready to introduce sustain-able solutions into their tourist habits. We performed this analysis with CA for multiway contingency tables. Each time, we examined how the activities described in question Q5 were assessed by respondents from European countries, and whether there were differences in their assessments due to age, gender, place of residence and employment status. In each case, we assessed how European seniors assess their preparedness to change their travel and tourism habits so as to be more sustainable (question Q5) and whether the readiness of EU seniors to introduce sustainable solutions into their tourism is related to age, gender, place of residence and employment status. The new variable, comprising layers, combined the country variable with demographic categories. For example, in the new country×gender variable, one of the categories was PL_M, PL_F, and for the country×age variable, one of the categories was PL_65-74, PL_75 +.

The real dimension for analyzing gender differences among European seniors in how they choose to make their tourism habits more sustainable was R^9. In Figure 1, in addition to the CA results in R^2, we have presented the scree plot for the principal inertias, which indicates that the presentation in the R^2 space is sufficient. The first two principal inertias explain 65.9% of the total inertia.

The assessments made by women and men from Spain regarding the possibility of changing their tourism habits to comply with the SDGs differ the least (the points are very close to each other), as they do in Austria, Luxembourg, Romania, Greece and Sweden (Fig. 1). Men and women living in Cyprus differ most in their assessments, as do those from Bulgaria, Belgium, Latvia, Hungary and Italy. Paying more to protect the natural environment (Q5_1) and choosing transport options based on their ecological impact (Q5_7), so as to change their tourist behavior to be more sustainable, were indicated by women from Malta, the Netherlands and Ireland, as well as women and men from Germany. All Swedes similarly assessed their ability to make changes, but additionally indicated a reduction in water usage on holiday (Q5_9). This factor relating to lower water con-

sumption is also characteristic of women from Slovakia, the Czech Republic, Ireland and Austria. Irish men and Maltese women declare that they are willing to pay more during their holidays in order to benefit the local community (Q5_2). Changes in tourist behaviors that contribute to carbon offsetting activities (Q5_5) are declared by Slovak men and all those living in Romania. The possibility of travel to less visited destinations (Q5_4) as an enabling factor for the SDGs is characteristic of women from the Netherlands, Finland and Portugal, and men from Poland and Latvia. The latter also declare that they will travel out of the high tourist season (Q5_3). Such a change in travel habits is also declared by women living in Cyprus, who additionally indicated the possibility of consuming locally sourced products on holiday (Q5_6). Opting to reduce waste while on holiday (Q8_8), is characteristic of men from the Czech Republic, Portugal, and women from Hungary and Croatia. Bulgarian men indicate that they are not prepared to change their habits (Q5_10).

The results of the CAs for the answer to question Q5 and their relationships with the next demographic variables are presented in Table 4–7. Table 3 presents the evaluation of the analysis carried out in the selected dimensions.

The scree plots in the case of the Q5×(country×gender) and Q5×(country×place of residence) analyses explicitly indicated the choice of two-dimensional space as the best option for presenting the relationship between the three analyzed variables (Table 3). In the case of the other two analyses, the elbow criterion was only noticeable on the scree plot for the three-dimensional space.

We decided to present the CA results for the four multiway contingency tables in the summary tables (Table 4–7) as it allowed us to assess the seniors' preferences in two ways. We have identified the differences between EU countries, as well as those between seniors within individual countries (answer RQ2).

As a result of the Q5×(country×age) analysis (Table 5), the most significant differences in the propensity to change travel habits were observed between younger and older people from all countries located in the eastern part of the EU, i.e. Latvia, Lithuania, Poland, the Czech Republic, Slovakia, Bulgaria and Romania, potentially due to the fact that many people from the 75+ group are already retired, and their pensions depend mainly on earnings achieved under different market conditions. The most similar

assessments are those of Luxembourg residents from both age groups, as well as of the Portuguese and Austrians.

When analyzing the Q5×(country×employment status) relationship, the most significant differences between retired and still working seniors were observed in Slovakia, Austria, Portugal and Malta (Table 6). These differences were the smallest in Germany and Denmark.

Based on the last multiway contingency table, Q5×(country×place of residence), the most significant differences in the possible activities undertaken during the planning of trips so that they are consistent with the SDGs were observed in Latvia among seniors living in medium-sized towns, large cities and rural areas (Table 7). We also observed differences between seniors living in Bulgaria in rural areas and towns (large or medium-sized). Similar differences to those in Bulgaria are also found in France and Denmark. People living in big cities and rural areas in Luxembourg have the most similar opinions, as do those from Malta and Romania.

The assessment of the differences between men and women in terms of their readiness to change their travel habits in favor of those consistent with SDGs has already been presented above (Fig. 1, Table 4). In addition, when planning their next holiday, younger seniors from Slovakia, Greece, Romania and Sweden, as well as people who are at least 75 years old from Sweden and Ireland, are ready to pay more to protect the natural environment (Q5_1), choose ecological transport (Q5_7), as well as reduce water usage (Q5_9) (Table 5). Residents of Luxembourg, Malta, Austria and Ireland aged 65-74 are ready to pay more to benefit the local community (Q5_2) during their next trips, as are Austrians, the Maltese and Luxembourgers from the older group of seniors. Another group of seniors is willing to consider four factors of sustainable travel: taking holidays out of the high tourist season (Q5_3), travelling to less visited destinations (Q5_4), consuming locally sourced products on holiday (Q5_6), and reducing waste while on holiday (Q5_8). These are younger seniors from Spain, the Netherlands, the Czech Republic, Poland, Finland, Portugal, Hungary, Croatia, Slovenia and Belgium, and older seniors from Portugal. Older Slovaks, Spaniards, Greeks, Lithuanians, Czechs and Poles declare they will contribute to carbon-offsetting activities (Q5_5). Italians and Danes aged 75 and older are not ready to change their travel habits to make them more SDG compliant (Q5_10).

Next, we assessed the differences between retirees and people who have not yet benefited from this privilege (Table 6). We noticed that retirees from

Malta, Luxembourg, Austria, Sweden, Romania, Ireland, Slovakia and Greece are ready to pay more on their next trips to protect the natural environment (Q5_1) or to pay more to the benefit of the local community (Q5_2). They are also willing to reduce water usage (Q5_9) on their next holiday. Retired Italians, Danes, Estonians, French, Cypriots, Lithuanians, Latvians, Hungarians, Slovenes, Belgians and Croats intend to take holidays out of the high tourist season (Q5_3), consume locally sourced products on holiday (Q5_6) and reduce waste (Q5_9) when planning their next trip. Estonians and Danes who are still working share this opinion. A sustainable trip, including travel to less visited destinations (Q5_4) and the choice of an eco-friendly means of transport (Q5_7), is declared by retired Portuguese, Dutch, Finns, Germans, Spaniards, Czechs and Poles, as well as Germans who are not yet retired. Bulgarian retirees and working Italians are not ready to change their holiday habits.

As a result of another analysis, which considered the place of residence of seniors, we distinguished the social groups that are the most diverse (Table 7). It is not possible to distinguish such strong groups as previously that connect seniors from many countries in the pursuit of the implementation of the indicated factors related to the SDGs. Greeks and the Dutch living in large cities, Austrians residing in rural areas, and Austrians, Irish and Luxembourgians living in rural areas are willing to pay more to protect the natural environment (Q5_1). When planning their next trip, seniors from large cities in Luxembourg and Denmark, as well as Danes from medium-sized towns, will consider the possibility of local community support (Q5_2). Residents of big cities in Cyprus, Estonia, Finland and Slovenia, and smaller towns in Finland and Portugal, will plan their next holiday out of the high tourist season (Q5_3), with the possibility of consuming locally sourced products (Q5_6). Seniors from big cities in Ireland and Malta, medium-sized cities in Lithuania and Slovenia, and rural areas of Greece, Latvia and the Netherlands, declared that they would go on their next vacation to less frequently visited destinations (Q5_4). In turn, residents of medium-sized cities in Ireland and Latvia will pay attention to the possibility of carbon-offsetting activities when planning a holiday (Q5_5). All Germans, as well as Slovaks from smaller towns, the inhabitants of medium-sized cities in Greece, Romania, Sweden and Luxembourg, and inhabitants of rural areas in France and Malta, will choose transport options based on their ecological impact for their next trip (Q5_7). Residents of large cities in the Czech Republic and Poland, medium-sized cities in Belgium, Estonia,

Croatia and Poland, and rural areas in Belgium declare that during their next vacation, they will reduce waste and water usage (Q5_8 and Q5_9). Bulgarians from medium-sized towns indicated that they are not prepared to make changes in their tourist behavior.

Based on groups of seniors with specific demographic characteristics identified in Table 3, it is possible to determine additional accuracies of their declarations regarding future tourist trips and their readiness to implement the SDGs (answer RQ4). Swedes are the most determined to protect the natural environment during their holidays (Q5_1) — this factor did not describe the Swedes only made on the grounds of place of residence. In turn, a distinguishing factor for the inhabitants of Malta is the willingness to conduct such tourist activities to support the local community during travel (Q5_2). Out-of-season tourist trips (Q5_3) will be chosen by the inhabitants of Cyprus, mainly women, retirees and the residents of big cities, as well as by Finnish residents aged 65-74 regardless of their place of residence, and seniors aged 65+ living in medium-sized towns and villages in Portugal, primarily women. Inhabitants of rural areas of the Netherlands, mainly women, people aged 65-74 and retirees, will decide to travel to less visited destinations (Q5_4). Such changes in tourist activity are also declared by younger retired seniors from Poland (mainly men), and women living in Portugal in both analyzed age groups. Contributing during travel to carbon offsetting activities (Q5_5) is most characteristic of Slovaks, especially men, working people, those aged 75+, and women and men from Romania who are not retired. Reported willingness to consume locally sourced products (Q5_6) is identical to the Q5_3 factor (off-season vacation trips), as shown in Table 3. Germans, regardless of gender and whether they are retired or not, and also irrespective of their place of residence, indicated that during their next trip, they plan to choose transport options based on the ecological impact (Q5_7). Swedes living in small towns and villages indicate a willingness to adopt the same changes, regardless of age and gender. Intent to reduce waste while on holiday (Q5_8) is most characteristic of Croats, especially women, younger seniors, and retired people living in medium-sized cities. Younger retired Belgians who do not live in big cities also determined these factors as changes in their tourist habits in the future. Willingness to reduce water usage on holidays (Q5_9) was indicated by Swedes, both women and men, young and old, and retired people, as a change in their tourism habits. Bulgarians, mainly men, retirees, and

living in medium-sized towns, are not prepared to change their holiday habits (Q5_10), nor are non-retired Italians aged 75+ (answer RQ2).

Discussion

In our article, we presented the results of a study on the ability of seniors to apply SDGs-compliant solutions in their tourism activities. The study was aimed at finding out the subjective evaluations of people aged 65+ living in EU countries. The conducted analyses were performed taking into account demographic factors such as their gender, age, place of residence and employment status. A comprehensive comparison of the obtained results with other studies is not possible, as we did not find studies on sustainable tourism covering a similar territorial and demographic range and referring to seniors. Thus, it is necessary to make fragmentary comparisons.

Our research has confirmed conclusions drawn by Hajra and Aggarwal (2023), Hu *et al.* (2023) and Patterson and Balderas (2020). Senior tourists are a heterogeneous group, not only in terms of geographic variation but also with regard to socioeconomic and demographic aspects within the countries studied. It is therefore appropriate that the approach we used for the study is also guided by the postulate of Balas and Abson (2022) and Miller and Torres-Delgado (2023), that research should be conducted at different levels of territorial divisions. The observed readiness of seniors to implement the ST solutions studied (Q5_1-Q5_10) varies regionally.

The results of previous studies related to tourism indicate differences in this activity among seniors from different age cohorts. However, differences in these behaviors are not always observed in terms of gender. Huber *et al*. (2018) indicates that the behavior of German senior tourists changes with age. This factor also differentiated the way that PERMA elements were perceived by the Portuguese in tourism as indicated in the research conducted by Mendes *et al*. (2022). Those authors observed no significant differences in the results of their studies conducted among men and women. Expanding the context of their analysis to include international comparisons, as called for by Chang *et al.* (2022) would provide an opportunity to highlight differences between men and women, as is the case in our study. Referring to the nationalities cited above, it can be pointed out that Portuguese women are inclined to travel in the future in the off-season to less visited destinations (Q5_3 and Q5_4). On the other hand, Portuguese men

declare less water consumption on subsequent trips (Q5_8). Germans (all) aged 65–74 say that they will pay more attention to environmental protection during their next tourist trip. Older Germans did not specify any particular sustainable measures to be undertaken during their next tourist trip.

The scope of the analysis conducted and finding for European seniors from different demographic groups the characteristics of their subsequent trips in terms of the pursuit of ST is in line with the findings of Sien Leong *et al.* (2023). They point out that tourism resources and attractions are the only destination attribute that allows us to predict seniors' intentions concerning their next trips. Thus, efforts should be made to ensure that factors influencing the selection of subsequent destinations are properly associated with SDGs.

A study conducted by Woosnam *et al.* (2020) indicates that emotional solidarity with locals is important while traveling for seniors from Serbia. Our study investigated whether on future trips European seniors were likely to pay more to the benefit of the local community (Q5_2) and consume locally sourced products on holiday (Q5_6).

Seniors belong to the generation that pays attention to the moral context of their behavior. Therefore, it is possible that sustainable solutions are being applied on a daily basis without tracing their source to the SDGs. Bolderdijk *et al.* (2013) thus argue that encouraging positive thinking and imagining oneself as a precursor of ST will positively direct seniors toward implementing ST. Through contact with sustainable solutions in tourism, seniors can transfer the acquired knowledge to their everyday lives (Almeida-Silva *et al.*, 2022; Losada *et al.*, 2019), and can require the tourism industry to implement sustainable solutions from their daily lives during their trips. Chilufya *et al.* (2019) and Rudge (2020) assert that actions should be taken to involve older people in promoting the SDGs.

To summarize the discussion, it is important to note a few more aspects of senior citizens' tourism that cannot be overlooked or treated in isolation. Seniors are a social group that is becoming more and more actively involved in tourism. At the same time, due to the aging of the population, there is a steady increase in the number of senior tourists (Kyriakou & Belias, 2017; Losada *et al.*, 2016; Silva *et al.*, 2020; Zsarnoczky *et al.*, 2016) and it is necessary to recognize their special needs. Creating age-friendly destinations and tourism or eliminating barriers (Chang *et al.*, 2022; Hu *et al.*, 2023; Sien Leong *et al.*, 2023; Zsarnoczky *et al.*, 2016) are activities also related to the SDGs, but aimed at tourists.

We did not analyze the reasons for non-participation in tourism, nor did we determine whether withdrawing from this activity is a conscious decision or whether it results from social exclusion. As indicated by Przybysz and Stanimir (2022), the lack of interest in tourism does not change over time; in the same countries (Portugal and Slovakia), tourists do not participate in tourism because they consciously decide not to participate in it, which may be culturally and socially conditioned. Non-participation in tourism depends first on the state of health and then on the financial situation of senior tourists' households (Przybysz & Stanimir, 2023). There may also be other barriers to non-participation, such as not knowing foreign languages (Przybysz & Stanimir, 2022).

Institutional arrangements for implementing the SDGs in tourism (WTO and UNDP, 2017) must address the needs of an aging population. If the assumptions of the AA and Healthy Aging strategies (WHO, 2002, 2015) are met, seniors will be more likely to travel, which will improve seniors' QoL (Cox, 2020; Patterson *et al.*, 2021). Tourism causes many psychological, mental and functional improvements for seniors, and affects their behavior before, during and after travel (Cohen *et al.*, 2014; de Andreis & Carioni, 2022; Loureiro *et al.*, 2022; Streimikiene *et al.*, 2021).

Conclusions

Our research has confirmed that seniors are a group of travelers with their own habits and preferences. The pattern of participation of seniors in tourism varies significantly from country to country and based on their demographic characteristics.

Our analysis distinguished demographic groups ready for ST and similar choices (answer RQ1). Women living in Malta, the Netherlands, Ireland, Germany, and Sweden, as well as men from Sweden and Germany during their next trips, will pay attention to protecting the natural environment (Q5_1), choose transport options based on ecological impact (Q5_7) and reduce water usage on holiday (Q5_9). Therefore, the tourism industry should prepare a sustainable tourist offer adapted to the choices of these populations. Tour and transport operators, as well as accommodation companies, should react with similar flexibility, when they consider the age of tourists for younger seniors from Sweden, Greece, Romania, Slovakia and Germany. For these groups, tourism professionals should prepare an

offer that enables protection of the natural environment (Q5_1), ecological transport (Q5_7), and reduced water usage on holidays (Q5_9). However, for tourists of the same age, but from Spain, the Netherlands, the Czech Republic, Poland, Finland, Portugal, Hungary, Croatia, Slovenia and Belgium, the tourist offer should guarantee the possibility of going out of season (Q5_3), traveling to less visited destinations (Q5_4), tasting local products (Q5_6), and reducing waste (Q5_8). Retired tourists from Malta, Luxembourg, Austria, Sweden, Romania, Ireland, Slovakia and Greece will, in future trips, introduce environmental protection (Q5_1), support for the local community (Q5_2) and reduction of water consumption (Q5_9). An offer enabling travel to less visited places using low-emission transport (Q5_4, Q5_7) should be prepared for retirees from Portugal, the Netherlands, Germany, Spain, the Czech Republic and Poland, as well as residents of large cities from Cyprus, Estonia, Finland, Slovenia and smaller towns from Finland and Portugal. The analysis indicated which groups of seniors are not pre-pared to carry out changes towards ST and the demographic differences between them (answer to RQ3). There were few situations in which the respondents chose Q5_10. They were living in medium-sized cities, retired citizens and men from Bulgaria, elderly and working Italians and elderly Danes.

Cohen *et al.* (2014) note that, in tourism, the SDGs have their supporters and opponents; among senior tourists, one cannot expect a fully positive acceptance of these solutions, not only because this is often associated with a change in existing patterns of behavior developed throughout their lives, but also because these activities are more expensive than previous tourist activities. Negative attitudes toward sustainable tourism may also stem from limited knowledge of the SDGs and the benefits that their realization is expected to bring to society.

Seniors are a social group that is increasingly actively involved in tourism with expectations that are rapidly changing due to the better use of modern technologies. Seniors' financial resources are the main concern regarding their choice to participate in tourism, though seniors are not a homogeneous group. Younger seniors have a better financial situation and are better adapted to participate in tourism due to their language skills and the use of modern technologies.

The presented profiles of European Union residents aged 65 and older pave the way for properly preparing the tourism industry for future tourists' changing requirements and expectations. In addition, a detailed de-

mographic analysis in assessing seniors' tourist preferences also indicates how the tourist offer should be built to attract tourists to implement the ST. Zsarnoczky *et al.* (2016) indicate that the heterogeneity of senior tourists forces the introduction of products and services to the market that meet their needs. Therefore, our study, providing the opportunity to identify tourism needs taking into account multiple determinants, opens the way for the proper adjustment of tourism and accompanying offers, strategies and innovative activities of key stakeholders (Hu *et al*., 2023; Patterson & Balderas, 2020). The results of the presented study are also relevant for verifying whether the assumptions of EU strategies regarding STs and SDGs are accessible to and applied by individuals. Senior tourism is an important sector within the SD of the tourism industry, which necessitates not only further research, but also establishing cooperation between institutions and deepening international analysis (Zhao *et al*., 2023). Subsequent studies concerning ST may include regional travel bubbles (Fusté-Forné & Michael, 2023).

We want to point out the limitations of our study. The analysis carried out concerned EU countries. Unfortunately, the data available from the Eurobarometer study is not collected periodically. It is necessary to collect data in such a way that it is possible to analyze them in terms of linking seniors' subjective opinions towards ST, assessing their financial and health situation, ability to use the Internet, and also referring to seniors' conscious participation in social life (especially the seniors' willingness to participate in social life). Reducing these limitations will enable future research to identify necessary actions to better adapt ST to the needs of senior tourists who want to travel by the SDGs.

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Ministry of Education and Science
Republic of Poland

Annex

Table 1. Characteristics of the study sample

Characteristics	Frequency, N=4842	(%)
Gender (G)		
Male (M)	2065	42.6
Female (F)	2753	56.9
No answer (NA)	24	0.5
Age (A)		
65-74 (1)	3175	65.6
75+ (2)	1667	34.4
Employment status (E)		
Retired 1)	4041	83.5
Other (2)	801	16.5
Place of residence (PR)		
Rural area or village (1)	1465	30.3
Small or medium-sized town (2)	1819	37.6
Large town/city (3)	1530	31.6
Not stated (4)	28	0.6

Source: Own calculations based on European Commission (2022a) data.

Table 2. Multidimensional contingency table example for countries (considering the gender variable as a layer) and variable Q5

Layers (gender)	Country	Final category symbol	Answer options in question Q5			
			Q5_1	Q5_2	…	Q5_10
Male	AT	AT_M	$n_{AT\_M,Q5\_1}$	$n_{AT\_M,Q5\_2}$	…	$n_{AT\_M,Q5\_10}$
	…	…	…	…	…	…
	SK	SK_M	$n_{SK\_M,Q5\_1}$	$n_{SK\_M,Q5\_2}$	…	$n_{SK\_M,Q5\_10}$
Female	AT	AT_F	$n_{AT\_F,Q5\_1}$	$n_{AT\_F,Q5\_2}$	…	$n_{AT\_F,Q5\_10}$
	…	…	…	…	…	…
	SK	SK_F	$n_{SK\_F,Q5\_1}$	$n_{SK\_F,Q5\_2}$	…	$n_{SK\_F,Q5\_10}$

Source: Own calculations based on Eurostat data.

Table 3. Assessment of Cas of multiway contingency tables

Indicator	Q5x(countryxgender)	Q5x(countryxage)	Q5x(countryxE)	Q5x(countryxPR)
Dimension (elbow criterion)	2	3	3	2
% of inertia	65.9	87.0	91.7	63.9

Source: Own calculations based on European Commission (2022a) data and Statistica13.3.

Table 4. Seniors' readiness to make their tourism and travel habits more sustainable (Q5) (the gender variable as a layer)

Variable	Categories	Q5_1	Q5_2	Q5_3	Q5_4	Q5_5	Q5_6	Q5_7	Q5_8	Q5_9	Q5_10
Gender	F	MT. NL, IE, DE, SE	MT	PT, CY	NL, FI, PT	RO	CY	MT, NL, IE, DE, SE	HU, HR	SE, SK, CZ, IE, AT, GR	
	M	DE, SE	IE	PL, LV	PL, LV	SK, RO		DE, SE	CZ, PT,	SE, GR	BG

Source: Own calculations based on European Commission (2022a) data and Statistica13.3.

Table 5. Seniors' readiness to make their tourism and travel habits more sustainable (Q5) (the age variable as a layer)

Variable	Categories	Q5_1	Q5_2	Q5_3	Q5_4	Q5_5	Q5_6	Q5_7	Q5_8	Q5_9	Q5_10
Age	65-74	SK, GR, RO, SE, DE	LU, AT, IE, MT	ES, NL, CZ, PL, FI, PT, HU, HR, SI, BE	ES, NL, CZ, PL, FI, PT, HU, HR, SI, BE		ES, NL, CZ, PL, FI, PT, HU, HR, SI, BE	SK, GR, RO, SE, DK	ES, NL, CZ, PL, FI, PT, HU, HR, SI, BE	SK, GR, RO, SE, DK	
	75+	SE, IE	MT, AT, LU	PT	PT	SK, ES, GR, LT, CZ, PL	PT	SE, IE	PT	SE, IE	IT, DK

Source: Own calculations based on European Commission (2022a) data and Statistica13.3.

Table 6. Seniors' readiness to make their tourism and travel habits more sustainable (Q5) (the employment status variable as a layer)

Variable	Categories	Q5_1	Q5_2	Q5_3	Q5_4	Q5_5	Q5_6	Q5_7	Q5_8	Q5_9	Q5_10
Employment Status	retired	MT, LU, AT, SE, RO, IE, SK, GR	MT, LU, AT, SE, RO, IE, SK, GR	IT, DK, EE, FR, CY, LV, LT, HU, SI, BE, HR,	PT, NL, FI, DE, ES, CZ, PL		IT, DK, EE, FR, CY, LV, LT, HU, SI, BE, HR,	PT, NL, FI, DE, ES, CZ PL	IT, DK, EE, FR, CY, LV, LT, HU, SI, BE, HR,	MT, LU, AT, SE, RO, IE, SK, GR	BG
	no retired			EE, DK	DE	MT, SK, FI, HU, CZ, RO, LU	EE, DK	DE	EE, DK		IT

Source: Own calculations based on European Commission (2022a) data and Statistica13.3.
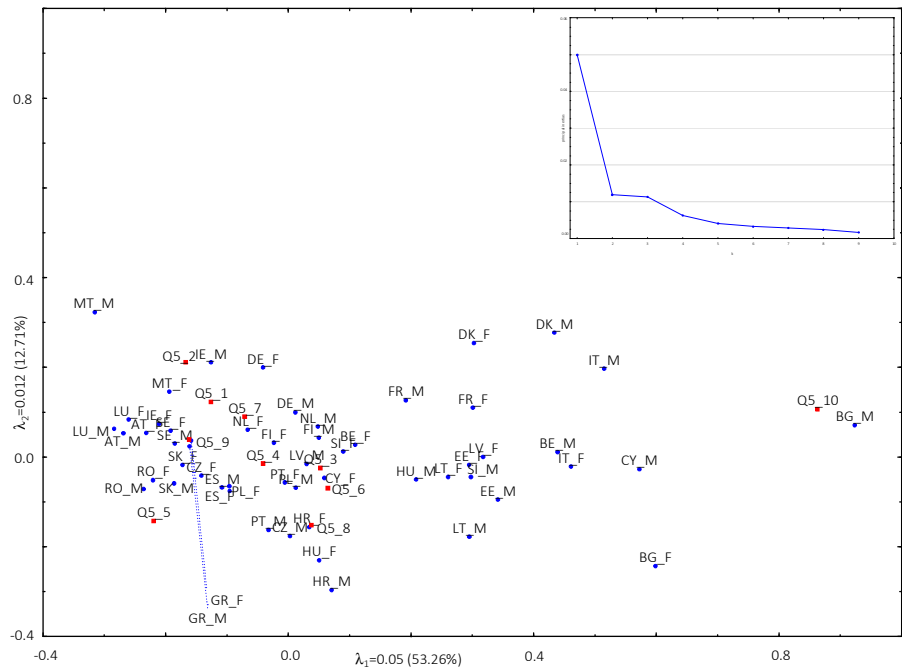
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Table 7. Seniors' readiness to make their tourism and travel habits more sustainable (Q5) (the place of residence variable as a layer)

Variable	Categories	Q5_1	Q5_2	Q5_3	Q5_4	Q5_5	Q5_6	Q5_7	Q5_8	Q5_9	Q5_10
Place of residence	big city	GR, NL	DK, LU	CY, EE, FI, SI	IE, MT,		CY, EE, FI, SI	DE	CZ, PL	CZ, PL	
	medium town	AT	DK	FI, PT,	LT, SI,	IE, LV,	FI, PT,	DE, GR, LU, RO, SE, SK	BE, ES, HR, PL	BE, ES, HR, PL	BG
	village	AT, IE, LU,		FI, PT,	GR, LV, NL,		FI, PT,	DE, FR, MT, SK	BE,	BE,	

Source: Own calculations based on European Commission (2022a) data and Statistica13.3.

Figure 1. Assessment of seniors' readiness (with regard to gender) to make their tourism and travel habits more sustainable

Source: Own calculations based on European Commission (2022a) data and Statistica13.3.