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RESEARCH ARTICLE OPEN ACCESS

Determinants Encouraging Tourists to Use Public Transport in Their Vacation Destination

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ABSTRACT

Implementing the concept of sustainability in tourism needs a significant reduction of vacationists' ecological footprint at destination level. A key aspect there is tourists' travel mode choice on-site. Based on an online-panel based survey in Italy and Germany and applying ordinal regression, this study analyzes for the destination South Tyrol, the impact of five blocks of potential factors on public transportation (PT) usage during a vacation: sociodemographics, everyday mobility at residence, attitudes toward climate change and environment, preferences for cars, and PT services at the destination, including the availability of a guest card for free PT use. The results of an ordinal regression analysis show that the availability of a guest card and the level of daily use of PT at home significantly increase PT usage. This is countered by daily use of the car at home and a positive affinity toward cars, having a negative effect on PT use.

1 | Introduction

The definition of tourism is mostly based on the fundamental concept that travelers leave their familiar living environment and travel to one or more other destinations (UNWTO 2010). During their stay at a destination, travelers visit attractions that prompted them to consider and choose the destination. Traveling to and excursions at the vacation destination generate tourist traffic, which in turn is associated with externalities, such as congestion, noise, and greenhouse gas (GHG) emissions. Tourism contributes significantly to global GHG emissions with tourist transport, having the highest share of these emissions (Gühnemann, Kurzweil, and Mailer 2021; Lenzen et al. 2018; UNWTO and UNEP 2008). By calculating an annual overall balance of the mobility of guests, residents and employees and the associated carbon emissions for an Alpine destination, Mailer et al. (2019) showed that around 80% of the annual transport-related carbon emissions of this destination result from tourist

travel showed that around 80% of the annual transport-related carbon emissions of this destination result from tourist travel. However, research mostly focuses on the travel to the destination comparing different means of transport (e.g., Unger et al. 2016) and not on the travel at the destination. Therefore, this research focuses on determinants bringing tourists to use environment-friendly means of transportation during their vacation at their destination.

As a reaction to reduce or avoid transportation-induced environmental impacts or conflicts, the Global Sustainable Tourism Council (GSTC) added to the Destination Criteria v2.0, the section "D11 Low Impact Transportation" aiming at "an increase in the use of sustainable, low-emissions vehicles and public transport and active travel in order to reduce the contribution of tourism to air pollution, congestion, and climate change" (see <https://www.gstccouncil.org/gstc-criteria/gstc-destination-criteria/>). By this, GSTC also addresses the

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conflicts between the residents at a destination and tourists in the field of transportation.

Sustainability has become a standard aspect of destination development within the last decade (Vučetić 2018). Therefore, destinations aiming at improving the level of sustainability of their tourism offers start to implement or improve sustainable and low emissions transportation, especially public transport offers for their guests. In leading European destinations (Duerkop and Gross 2012; Gronau 2017; Heslinga, Hillebrand, and Emonts 2019; Scuttari, Volgger, and Pechlaner 2016), the integration of free PT in destination guest cards has become popular (Scuderi and Dalle Nogare 2018). For instance, in Germany and Italy, travelers strongly associate sustainable tourism with high-quality public transportation (PT) at the destination level (Bausch et al. 2021), indicating a certain level of expectations when visiting these destinations. Destination managers having included PT for free in their destination cards report an increasing demand for and use of PT by their guests (Gronau 2017).

However, these reports do not provide detailed explanations of the effects of introducing a guest card that includes free use of public transport. This study aims to close this research gap. In particular, it will analyze which groups of guests can be persuaded to use public transport through the guest cards and which groups of guests will continue to use their own cars and not accept the offer. Sociodemographics, attitudes toward cars and public transport as well as daily mobility behavior at the place of residence are also considered. Finally, given that information is fundamental in public transport provision (Permana et al. 2024) gaps in communicating the guest card and its handover to guests are analyzed. This in-depth analysis is intended to close the research gap on the effects of guest cards with included mobility services and to provide destination managers with concrete tips for the further development of guest card services.

2 | Literature Review

The critical role of transport infrastructure in destination development and competitiveness, as an integral component of the overall tourism offering, has been extensively studied (Fu and Chen 2019; Wan and Li 2013). Research also indicates that the accessibility of a destination and the availability of local mobility options significantly influence destination choice (Keshavarzian and Wu 2017). However, it is increasingly evident that exceptional accessibility to a destination and its primary attractions can lead to issues such as local overvisitation or overtourism. A common consequence is the emergence of mobility challenges for the local population, primarily due to congestion within the destination's transport system (Curtale, Sarman, and Evler 2024). This situation contributes to the growing resentment toward tourism among local residents, reflecting the negative social impacts of tourism on local communities and prompting discussions around degrowth strategies in tourism research (Fletcher et al. 2019). The resulting local opposition to tourism intensifies the pressure on destination management to mitigate the adverse effects of tourism, particularly those resulting from traffic and affecting the transportation systems. One potential solution is to shift tourist-induced traffic to PT, thereby alleviating the burden on the local traffic infrastructure.

Offering tourists free access to PT could serve as an effective incentive to enhance their acceptance of this alternative. This raises the question of which factors, including the cost-free use of PT, encourage or hinder the adoption of sustainable mobility options, such as public transport, over the use of private or rented cars during vacations.

Several articles have analyzed just these additional vacation-specific factors, including review papers that propose various versions of systematizing or categorizing these factors. For example, Gross and Grimm (2018) and Le-Klähn, Roosen, et al. (2015) identify the following categories: demographic characteristics of visitors (e.g., age, gender, income, and nationality), travel characteristics (e.g., length of stay and companions), destination attributes (e.g., infrastructure and PT system), trip profile (motivations and planned activities), attributes of the means of transportation (such as cost, time, and comfort), and the process of collecting information and planning the stay (e.g., how far in advance to plan and book).

We build partially on this taxonomy in our article but focus more on facets pertaining to travelers' mobility behavior where they live, and their attitudes toward environmental issues and different modes of transportation. Although there exists a plethora of publications that deal with the choice of means of transport in everyday mobility in general, the following literature review concentrates on publications that establish a connection between tourism and everyday mobility. This focus was chosen to be able to transfer the results to the case of vacation mobility.

2.1 | Sociodemographic Characteristics

Sociodemographic variables may significantly influence people's intention to use PT in daily life. While people of younger and older age groups are prone to have a higher affinity for PT (Shrestha et al. 2017), women appear to appreciate, value, and use PT more than men (Kuhnimhof et al. 2012; Minelgaitė, Dagiliūtė, and Liobikienė 2020). This was also confirmed by a study by the European Institute for Gender Equality (2023). A study by Dingil and Esztergár-Kiss (2022), using multinational data on modal shares in an urban environment, found a strong relationship between education level and transport mode choice: less driving and more PT use are observed in communities with a higher share of tertiary education. Another influential factor is income. Paulley et al. (2006) showed, for Great Britain in detail, and at an international level in general, that the increase in income over the last decades was coupled with higher car ownership and a corresponding decline in demand for PT.

Differences in the use of means of transportation between people living in rural or urban areas have frequently been analyzed and reported (see the methodological review comparing several studies of Chmielewski and Olenkowicz-Trempała 2018). A significantly higher share of car usage by people living in rural areas was shown for regions in Great Britain (Tao, Fu, and Comber 2019), Germany, the Netherlands, and Italy (Berri 2009). The prevailing use of a private vehicle for daily mobility in rural areas can be explained by spatial dispersion and, hence, longer distances that must be covered to get the services one needs (Ao et al. 2022),

as well as a lower density and service frequency of PT services compared with metropolises and cities (De Vos et al. 2016). Van Eenoo (2023) confirmed these results and added household size and structure as further factors influencing car ownership. She showed that, on the one side, households with children are more likely to own a car, yet the financial situation can set limitations (e.g., in single-parent households in the lower income range). This results in a higher car use not only for commuting or shopping, but also for leisure purposes (Czepkiewicz et al. 2020; Le-Klähn, Roosen, et al. 2015; Smith, Robbins, and Dickinson 2019; Tóth and Dávid 2010). In other instances, scholars have used the place of origin/nationality of tourists as proxies for their mobility behavior at home, as there are clear differences in mobility cultures across countries (Haustein and Nielsen 2016).

In this study, we question whether the above-discussed sociodemographic variables do influence the use of PT in daily travel and during vacation. The literature on the use of PT at tourist destinations (Bursa, Mailer, and Axhausen 2022b; Gross and Grimm 2018; Le-Klähn, Roosen, et al. 2015; Maltese and Zamparini 2022; Nguyen et al. 2017; Zamparini and Vergori 2021; Zientara, Jazdżewska-Gutta, and Zamojska 2021) suggests the impact of selected sociodemographic or traveler characteristics on mode choice. This was also found by Masiero and Zoltan (2013) stating that “the transport mode choice of tourists can be explained by demographic variables and by the familiarity of the destination, with the latter also showing a consistent effect with destination movement patterns.” However, the results are often inconclusive and should not be interpreted in isolation, but in combination with the other four blocks of potential factors, which we discuss in more detail below.

2.2 | Everyday Mobility at the Home Location

Everyday mobility is largely a result of nondiscretionary activities (work, school, etc.) characterized by stable locations and repetitive patterns, dependent on residential location and intra-household dynamics, which all shape travel behavior of an individual. Other—discretionary—purposes, such as leisure trips, do not demonstrate such stability (Ohnmacht, Götz, and Schad 2009), and thus, are difficult and expensive to measure, both in everyday and vacation contexts. These journeys, however, are often influenced by commuting behaviors and habits spilling over to leisure travel, as suggested by Tomasdotter, Ek, and Wårell (2023). Whether the similar holds for vacation travel is unclear, as recent studies have shown that people’s choice of means of transportation in everyday life differs from that on vacation (Maltese and Zamparini 2022; Zamparini et al. 2022).

The rationale for investigating whether daily mobility behavior, resulting from all purposes in the familiar living environment at the place of residence, is reflected in mobility on vacation is that the former is easier to measure and more likely to be influenced (assuming 25 days of leave per year, we have about 340 days of everyday mobility a year compared to about 25 days of vacation-related out-of-home mobility). Given this, if the hypothesis that transportation behavior on vacation results from transportation

behavior in everyday life proves true, then this is a very effective way to understand and shape visitor mobility. Schlemmer et al. (2019) already addressed this relationship in their study on the possible effects of physical activity during vacation on everyday mobility but could not find clear results. If it turns out that mobility at home does not translate into mobility on vacation, they must be treated as two independent phenomena.

2.3 | Attitudes Toward Climate Change and Environment-Friendly Behavior

Another factor that might influence the mode choice of an individual is their attitude toward environmental and climate change concerns. In a meta-study analyzing 58 primary studies, Lanzini and Khan (2017) found that environmental variables have a significant influence on the intentions to use means of transportation with a lower environmental impact. In a Norwegian study, Nordlund and Garvill (2003) revealed the role that awareness of the negative environmental impact of car use has on increasing the propensity to use PT. Further scholars have consistently demonstrated a significant role of attitude and identities in reflecting travel behavior and environmental/climate change concerns—emphasizing the link between travel behavior and social psychology (Anable 2005; Van Acker, Van Wee, and Witlox 2010). Yet, the results in this field are not always congruent, as many studies just examine the willingness to travel in an environment-friendly way but not the real behavior of the travelers. This leads to the so-called attitude-behavior gap (Antimova, Nawijn, and Peeters 2012; Juvan and Dolnicar 2014), reported especially for long-distance trips. Abegg et al. (2019) showed that even if there is a big gap between awareness of climate effects of tourist travel and the willingness to travel less often, to nearer destinations, or avoid flying, tourists are more willing to use more sustainable means of transport at the destination. However, recent research results about daily mobility (Brock, Williams, and Kemp 2023) confirmed earlier results (Goodwin and Lyons 2010) that the attitude-behavior gap also exists in daily mobility behavior.

In addition, it has not yet been established whether there is a link between ‘positive’ attitudes toward environmental issues and the use of active and sustainable transportation at destinations. Hibbert et al. (2013) claimed that “pro-environmental actions” undertaken by visitors are primarily in line with what they identify with. However, it is not clear whether this corresponds to the identities and lifestyles that guests would like to create for themselves for the duration of their vacation, which may differ from their “at home” identity and, therefore, not reflect their true attitudes. In view of the results reported in the literature and given that many alpine destinations currently try to add sustainability to their destination image core values (Heslinga, Hillebrand, and Emonts 2019), we included the aspect of environmental attitudes in this study, to clarify their role during vacation.

2.4 | Attitudes Toward Cars

In her study on travel behavior in the United Kingdom, Anable (2005) established profiles of six groups with travel

behavior and pro-environmental behavior factors, using the theory of planned behavior. The six groups differ in their pro-environmental attitudes, concerning the direction (positive to negative) and intensity (not existing to existing). But in the model, the use of PT and other sustainable alternatives could first be established by introducing an additional variable the affinity to cars. Research into factors for preferring the car as means for transportation brought out a list of instrumental reasoned factors, such as time advantages, safety, comfort, or costs. But the use of a car does not only rely on practical aspects of daily mobility, as commuting to work or places of study, visiting relatives, organizing the kids' activities or managing the daily supply. The preference for the car is also related to affective and symbolic values as developed in affect theories (Steg, Vlek, and Slotegraaf 2001; Anable & Gatersleben, 2005). Within the group of affective values, two main factors were identified: control and independence, while in the group of symbolic values the aspect of gaining and demonstrating social status was identified as central (Lois and López-Sáez 2009). In our study, we argue that the described general factors of control and independence are identical during a vacation and, therefore, might have an influence on the acceptance of PT. Furthermore, we see the aspect of social status as a factor that is mainly linked to daily life and the social environment and less to vacation. Looking at the fleets of car rentals in mature European vacation destinations, it becomes visible that most European travelers during vacation are not willing to pay higher prices for prestigious vehicles. Therefore, we did not add this factor to our analysis.

2.5 | Variables Characterizing the Vacation

Le-Klähn and Hall (2015) conclude that low use of PT in destinations (especially non-urban destinations) is due to poor accessibility and network density, insufficient frequency, unattractive schedules, long travel times, and a general mismatch with the needs of tourists who value ease of use, flexibility, and convenience. This is further intensified by difficulties when moving around with luggage or sports equipment and by weather conditions (Bursa, Mailer, and Axhausen 2022a).

Besides the quality of the transportation services at the destination, researchers have also investigated attributes describing the actual vacation and any associated issues. Among many factors, the literature reports that some vacation characteristics—that is, duration of stay at the destination, spending capabilities, and the group (travel) size (Bieland, Carsten, and Claudia 2017; Bursa, Mailer, and Axhausen 2022a; Gross and Grimm 2018; Guiver et al. 2007; Le-Klähn, Gerike, and Michael Hall 2014; Zamparini and Vergori 2021)—influence mode choice at the destination. Furthermore, in a choice modeling study from Austria, Bursa, Mailer, and Axhausen (2022b) revealed that the presence of children under 6-year old makes tourists very unlikely to choose anything but car for local transportation.

On the duration of stay, Bieland, Carsten, and Claudia (2017) assessed the determinants of the mode choice of visitors in the city of Kassel, Germany, showing that same-day visitors would instead prioritize fast and direct transport connections while

overnight visitors (mainly young singles/couples and adults without children) stick to more environment-friendly travel behavior. However, this is specific to the group (travel) size. According to Bieland, Carsten, and Claudia (2017), families and older people would resort to multi-person transport prioritizing their convenience and ability to travel together. This is in line with Bursa, Mailer, and Axhausen (2022b), who noted that, with increasing age, the response to travel time becomes less negative—speaking in favor of PT, which typically takes longer than driving.

Based on a study from the UK, Downward and Lumsdon (2004) suggested that visitors traveling by private vehicles are likely to generate more spending at the destination. Since we have information on daily spending in our data, we decided to see if higher spending correlates negatively with the use of PT as in Downward and Lumsdon's study.

Bamberg, Ajzen, and Schmidt (2003), in a study among students in Germany, showed that offering a student semester ticket allowing a free-of-charge use of PT has a positive impact on the acceptance of the campus bus line. Assuming that these study results might be valid also for tourists in a destination allows for our hypothesis that guest cards having included the use of a destination PT system is an incentive to encourage the use of PT by tourists. Gronau (2017) approaches the concept of guest tickets from a behavioral change perspective. However, this study is based on qualitative stakeholder interviews (transport providers, accommodation providers, politicians). Thus, its results are not based on the mobility data of the tourists reporting on the use of the guest cards. To add the travelers' perspective, we included the use of the guest card as a further variable in our study.

Our discussion of findings from prior literature leads to the following three research questions that we try to answer in our empirical study:

RQ1. *Which variables from the first four blocks of factors, concerning sociodemographic characteristics, everyday mobility at home, attitude toward climate change and environment-friendly behavior, and attitude toward cars as means of transportation have a statistically significant impact on frequency of PT use on vacation?*

RQ2. *Which characteristics of the vacation have a statistically significant impact on PT use on vacation?*

RQ3. *Does the provision of a guest card, which includes free use of local and regional PT, influence tourists' mode choice toward more sustainable mobility?*

We see these research questions are pressing and relevant, especially for policymakers, managers, and local authorities in tourist areas who are striving to bring tourists to use PT on-site, but do not know how or need evidence of the effectiveness of their actions. The concept of guest cards is gaining popularity, more regions are thinking about to follow in the footsteps of the pioneers to stay competitive. But such initiatives likely cost a lot of money, which should not be done without scientific evidence, which our paper delivers.

3 | Data and Methods

This study is based on data collected in spring 2023 in a comprehensive survey analyzing the mobility behavior of tourists having spent at least one vacation in South Tyrol, Italy, in the last 4 years. The study covered mobility behavior at the place of residence, the mode choice for traveling to the destination, and mode choice during the vacation. Furthermore, data on sociodemographic characteristics as well as mobility and environment-related attitudes were collected. South Tyrol welcomes yearly about 8 million tourists generating about 35 million overnight stays. The summer season 2023 had a share of about 5.2 million arrivals and 22.4 million overnight stays. More than half (52.3%) of the summer overnight stays are generated by guests from Germany, further 28.7% by guests from Italy (ASTAT 2023). The autonomous province of Bolzano provides an excellent network of PT based on regional trains, buses, and cable cars, which allows locals and guests to reach any town and attraction within the territory all year using PT. Furthermore, a guest card is available which is handed out to guests by more than half of the hosts when checking into their accommodation. This guest card includes free access to any type of PT of the entire province transportation network.

As Germany and Italy are the main source markets of South Tyrol, covering 81% of all overnight stays, 1000 participants were recruited from each country using online panels of Norstat (see www.norstat.com). Quota sampling was applied considering gender, age structure, education level, and the season of the stay. The quotas were fixed on the basis of the guest statistics from the statistical office of South Tyrol (see <https://astat.provinz.bz.it/de/default.asp>). After a soft launch with 50 participants in each country and a control of the completeness and plausibility of collected data, the full launch took place 21st of March to 10th of April 2023 in both countries. From the 1963 cases with fully completed questionnaires for this study, the subset of participants was selected, who had their stay during the spring, summer, or autumn period in 2021 or 2022 and arrived by car. This selection was done, first, as the touristic product of the destination in the winter period is strongly related to skiing and therefore implies other mobility needs than during the rest of the year, and second, to avoid a COVID-19 impact concerning the use of PT, as it was observed in 2020. Finally, 807 cases (413 German, 394 Italian) were included in this analysis. Table 1 shows the sociodemographic structure of the subset. Traveling by car is not only the predominant mode of transport, but also offers tourists—unlike when traveling by train—the choice between different modes of transport at the destination, which is essential for our study.

To collect data describing the five blocks of factors, we used closed questions with ordinal or Likert scales. The variables and scales for sociodemographic characteristics are listed in Table 1. The everyday mobility at residence was assessed by, “How frequently do you use the following means of transportation in everyday life?”, offering as means car as driver, car as passenger, PT (bus, tram, metropolitan, regional and long-distance trains and busses), active mobility (walking, conventional bike, and e-bike), and other (e-scooter, scooter, motorcycle, taxi, and further). A five-point Likert scale was used with categories between never (1) and daily (5).

TABLE 1 | Sociodemographic structure of study dataset.

Sociodemographic characteristic	Percentage frequency	Coding
Age		
Below 18 years	0.0%	1
18–34 years	10.7%	2
35–49 years	35.3%	3
50–64 years	29.0%	4
65+ years	25.0%	5
Gender		
Male	55.4%	0
Female	44.6%	1
Monthly net household income		
Below €1500	4.7%	1
€1501–€2500	19.7%	2
€2501–€4000	43.2%	3
€4001–€6000	23.6%	4
€6000 and above	8.8%	5
Level of education		
Up to secondary school	26.5%	1
High school/University entrance diploma	31.0%	2
University degree or higher	42.5%	3
Household size		
One person	10.5%	1
Two people	39.7%	2
Three and more people	49.8%	3
Country		
Germany	51.2%	0
Italy	48.8%	1
Area of living		
Urban (integrated into urban transport)	65.2%	0
Rural (only served by regional transport)	34.8%	1

Note: N = 807.

To measure the climate-change and environment-friendly behavior, we used nine statements drawn from Schleich, Schwirplies, and Ziegler (2018) in combination with a five-point Likert scale (1 = does not apply at all, to 5 = fully applies). Afterward, we conducted a principal component analysis (Varimax rotation) and found three main factors explaining 74.0% of the total variance from the nine statements. Factor 1 merged statements about the acceptance of environmental

and climate protection even if it leads to personal restrictions. Factor 2 included statements about the degree of conviction environmental and climate protection are necessary and improve the quality of life. Factor 3 included statements asking for the willingness to adapt one's own lifestyle for the sake of the environment and climate. For interpretation and comparability of the results, these three factors were converted to an ordinal scale with five ranks using a linear transformation based on the minimum and maximum factor scores.

For the attitude toward cars as means of transportation, we followed the results of Van, Choocharukul, and Fujii (2014). From this study, we used the two statements "For me, driving a car means freedom and independence" and "I like to travel by car" for the independence factor and "The car is essential for my leisure activities" and "The car is indispensable for my everyday life" for the control factor. Because of the high correlation of the last two variables and related multicollinearity problems for the later regression in the analysis, only the first statement was used. The three statements of this block were measured by a five-point Likert scale (1 = do not agree at all to 5 = fully agree). The mobility-related characteristics of the last vacation were duration (number of days), spending per day and person (ordinal with 4 categories below €100 to €200 and more), the number of people traveling together (group size), and binary if people received a guest card or not (people not remembering were excluded from the analysis). For all statistical analysis including the ordinal regression, SPSS 24 was used. An overview of the used variables and their coding can be found in the Appendix A at the end of the paper.

4 | Results

An ordinal regression analysis was conducted with the dependent variable being based on the frequency of use of bus or train during the last vacation. This variable was computed by assessing the frequency of respondents' use of the bus and that of the train using a five-point scale (1 = never, 2 = very rarely, 3 = sometimes, 4 = frequently, and 5 = very frequently). The dependent variable was computed as the maximum between the two frequencies. For example, if a respondent reported using the bus very rarely (i.e., indicating 2 on the scale) and the train frequently (i.e., 4 on the scale), then the value of the dependent variable for this respondent was 4. The rationale was that respondents' decision to use buses or trains may be contingent on the presence of transportation infrastructures and services in the surrounding area. Therefore, the maximum between the two afore-mentioned frequencies can better reflect one's true propensity to use PT than the sum of the two frequencies. The ordinal regression results are summarized in Table 2.

We conducted preliminary multicollinearity checks by computing a variance inflation factor (VIF) value for each independent variable in a linear regression analysis. VIF values ranged from 1.072 to 1.965, far below the recommended threshold of 10 (Yan and Su 2009), thus suggesting negligible multicollinearity among the independent variables. Therefore, given the ordinal nature of the dependent variable, we conducted an ordinal regression analysis. The estimated model was significant

($-2 \text{ Log Likelihood} = 1958.377$, $\chi^2(23) = 220.049$, $p < 0.001$), and goodness-of-fit statistics were acceptable (Pearson $\chi^2(3201) = 3213.883$, $p = 0.433$). The statistical results summarized in Table 3 showed that the dependent variable denoting respondents' propensity to use PT was negatively related to their monthly income ($B = -0.269$, $p = 0.001$), country ($B = -0.827$, $p < 0.001$), degree of acceptance of environmental and climate protection ($B = -0.177$, $p = 0.014$), and liking for traveling by car ($B = -0.215$, $p = 0.007$). Instead, the same dependent variable was positively related to the use of car as a passenger ($B = 0.226$, $p = 0.011$), use of PT such as local, regional, long-distance means of transportation or plane ($B = 0.505$, $p < 0.001$), use of individual means of transportation different from car ($B = 0.490$, $p < 0.001$), as well as to respondents' degree of conviction that environmental and climate protection are necessary and improve quality of life ($B = 0.236$, $p < 0.007$), vacation duration ($B = 0.230$, $p < 0.001$), and whether they received a guest card during the vacation ($B = 1.049$, $p < 0.001$).

To analyze the RQ3 a further in-deep investigation of the variable describing, if a study participant received a guest card to use PT during the stay free was done. By experiences of the hotel owner association HGV (see <https://www.hgv.it/de/>) not all guests automatically receive a guest card as well as knowing about it and therefore request it. This allows the hypothesis that for shorter stays guests receive less frequently the guest card. Table 3 shows the result of a crosstab between the two variables of having received a guest card and the duration of the guests' stay.

The Pearson Chi-square test for independence of the variables shows a test statistic value of 29.541 (0 cells have expected count less than 5) which has an asymptotic significance smaller than 0.001 at six degrees of freedom. Therefore, the hypothesis of independence of the two variables must be rejected at significance level of 0.1%.

Further interpretation of the result is based on the Wald test-statistic values of the test for coefficient estimation not being zero of the ordinal regression. This statistic follows approximately a χ^2 -distribution (Liu 2016) with one degree of freedom and therefore allows a ranking. This ranking can be interpreted as a measure of variable importance and, by this, an initial rank ordering of our independent variables' contributions to the regression model comparable to the standardized estimators of the β -coefficients of linear regression (Nathans, Oswald, and Nimon 2012). Table 4 shows the regression results for significant independent variables in descending sorting by Wald test-statistic values.

5 | Discussion

In our ordinal regression, we used independent variables from the five potentially explanatory blocks: sociodemographic characteristics (7), everyday mobility at residence (5), attitude toward climate change and environment-friendly behavior (3), attitude toward cars (3), and characteristics of the last vacation (5). Considering the complexity of the examined phenomenon and the huge number of factors that might contribute to explaining people's use of PT in tourist destinations, we assume that the five blocks of determinants used in our regression

TABLE 2 | Results of regression analysis.

Variable	Estimate (<i>B</i>)	Std. error	Wald test (df=1)	<i>p</i>
Intercept 1	3.000	0.905	10.983	0.001
Intercept 2	3.813	0.909	17.606	<0.001
Intercept 3	5.186	0.918	31.887	<0.001
Intercept 4	6.635	0.937	50.163	<0.001
Sociodemographic variables				
Age	−0.064	0.080	0.643	0.422
Gender	−0.248	0.150	2.754	0.097
Monthly income	−0.269	0.085	10.142	0.001
Level of education	−0.008	0.093	0.007	0.934
Household size	0.088	0.130	0.460	0.498
Country	−0.827	0.167	24.431	<0.001
Area of living	−0.064	0.154	0.172	0.678
Everyday mobility at residence				
Use of car as driver	0.032	0.108	0.089	0.765
Use of car as passenger	0.226	0.089	6.456	0.011
Use of PT	0.505	0.104	23.362	<0.001
Use of individual means of transportation different from car	0.490	0.100	23.935	<0.001
Use of means of active mobility	0.065	0.081	0.640	0.424
Attitudes towards environment and climate change				
Degree of acceptance of environmental and climate protection	−0.177	0.072	5.984	0.014
Degree of conviction that environmental and climate protection are necessary and improve quality of life	0.236	0.088	7.258	0.007
Willingness to adapt their own lifestyle for the sake of environmental and climate protection	0.153	0.089	2.951	0.086
Attitudes towards cars				
Liking for traveling by car	−0.215	0.080	7.220	0.007
Car is essential for leisure activities	0.117	0.089	1.724	0.189
Car is indispensable for everyday life	−0.047	0.086	0.306	0.580
Characteristics vacation in South Tyrol				
Vacation's duration	0.230	0.054	18.468	<0.001
Spending during vacation	0.092	0.064	2.097	0.148
Group size	−0.041	0.055	0.577	0.447
Children were present and traveled with the respondent	−0.005	0.199	0.001	0.979
Guest card was received	1.049	0.148	50.215	<0.001

Note: *N* = 807. Dependent variable: Frequency with which respondents used either a bus or train as means of transportation (maximum between the frequency with which respondents used bus and the frequency with which they used train as means of transportation). Link function: Logit; −2 Log Likelihood = 1958.377, $\chi^2(23) = 220.049$, $p < 0.001$; Goodness-of-fit: Pearson $\chi^2(3201) = 3213.883$, $p = 0.433$. McFadden Pseudo $R^2 = 0.101$; Test of parallel lines: −2 Log Likelihood = 1909.389, $\chi^2(69) = 48.979$, $p = 0.968$.

TABLE 3 | Guest card reception and duration of stay.

		Last vacation in South Tyrol: How long did your stay in region last? (duration in overnight stays)							Total
		1	2	3	4–6	7–9	10–13	14+	
During your last stay in South Tyrol, did you receive a guest card from your accommodation for free use of public transport and other services in South Tyrol?	No	77.8%	59.8%	42.1%	44.3%	42.1%	35.9%	25.0%	45.5%
	Yes	22.2%	40.2%	57.9%	55.7%	57.9%	64.1%	75.0%	54.5%

model captured a substantial portion of the variance of the dependent variable.

Looking at the first block, the sociodemographic characteristics, we find only two of the seven used independent variables to significantly contribute to explaining respondents' use of PT: country and monthly income. The value and negative sign of the estimated coefficient for country shows that nationality strongly influences PT use: Germans (coded as 0) use PT more frequently during vacation than Italians (coded as 1). This is in line with Haustein and Nielsen (2016), who revealed that these two countries belong to fairly different mobility cultures, with Italians exhibiting higher preference for driving than Germans and placing more value on speed and convenience rather than on environmental aspects. Apparently, these cultural or national characteristics also hold true on vacation.

In terms of income, people with higher earnings are less likely to use PT at their destination frequently. On the other hand, the frequency of PT use during vacation is positively influenced by the frequency of public transport use on a daily basis at home, as well as the frequency of traveling by car as a passenger and by alternative means of transportation. We found no significant effects of age, gender, level of education, household size, and area of living (rural vs. urban). In our sample, 95.9% of the participants traveled together with at least one other person. Concerning the insignificant variables—age and gender, which are important factors in daily mobility behavior—the explanation could be that people do not decide alone about their mode choice while on vacation, which fundamentally differs from a daily life scenario.

The second block of predictors, regarding everyday mobility at residence, describes the mode choice preferences of the study participants. Further confirmation about behavioral continuity during vacation becomes visible: the highest positive contribution to PT use during vacation is given by the level of usage in daily life. This suggests that regular use of PT means better control of PT and reduced reservations about possible disadvantages, such as crowding, longer travel time, or a lack of comfort, and increases the visibility of advantages as arrival directly at or close to the attractions, no traffic jams (train) or even economic advantages (no parking fees). Also, an apparent positive effect can be seen for “other individual means of transportation different from car.” In the group of people frequently using such type of transportation, we find a higher share of younger and urban people being used to situational decision-making about mode choice. This might also explain the strong effect of this

independent variable for the vacation, but it could be explored further.

For the third block of independent variables, regarding attitude toward climate change and environment-friendly behavior, none of the three appeared particularly relevant. Yet two of the three reached statistical significance: degree of acceptance of environmental and climate protection ($p=0.014$) and degree of conviction that environmental and climate protection are necessary and improve quality of life ($p=0.007$). These results can be interpreted as a weak impact on the environmental and climate-related attitudes of travelers. However, it concurrently shows that the described attitude-behavior gap exists not only for long-distance trips or daily mobility but also for mode choice during a vacation. This result is in line with the results of Abegg et al. (2019) mentioned earlier and partially with the findings of Zamparini et al. (2022), who showed a divergent mobility behavior for young tourists by gender (less environment-friendly) and destination type (top destinations more environment-friendly).

Regarding the three independent variables describing the attitude toward using a car, only the item “liking for traveling by car” reached significance. This item is part of the affective value of independence and fits well with the general travel motive of personal escape as “to get away from my normal environment” and interpersonal escape as “to get away from a stressful social environment” (Doran, Larsen, and Wolff 2015). The other two insignificant items, linked to the affective value of control, “perception that car is essential for leisure activities,” and “perception that car is indispensable for everyday life,” are not relevant for mode choice during vacation. The former is particularly interesting as its significance would have indicated that people think they need the car to realize their vacation activities. Because of the excellent PT services available in South Tyrol, this result could indicate insufficient information. However, it should not be regarded as generalizable and might differ for other destinations.

Within the block of five variables characterizing the last summer vacation in South Tyrol, only two are significant: the duration of the last vacation and guest card reception. Both variables show p values below 0.001, which proves their significant relevance in prompting PT use. The use of PT increases with the duration of stay (see Table 3), which was also observed in a study for Germany by Gross and Grimm (2018). As people on a short stay receive a guest card less frequently than those on longer vacations, two potential explanations arise: First, hosts tend not to hand out the guest card to short-stay tourists as they

TABLE 4 | Ranking of independent variables by Wald test statistic.

Rank	Variable	Wald test statistic	p
1	Guest card received during last vacation	50.215	<0.001
2	Country	24.431	<0.001
3	Use of individual means of transportation different from car in everyday mobility	23.935	<0.001
4	Use of PT in everyday mobility	23.362	<0.001
5	Last vacation's duration	18.468	<0.001
6	Monthly income	10.142	0.001
7	Liking for traveling by car	7.220	0.007
8	Degree of acceptance of environmental and climate protection	7.258	0.007
9	Use of car as passenger in everyday mobility	6.456	0.011
10	Degree of conviction that environmental and climate protection are necessary and improve quality of life	5.984	0.014

presume that these guests do not use it. Second, guests with longer stays are better informed and actively ask for the guest cards. Therefore, the significant effect of a short stay on PT use might be the result of a reciprocal effect. Our results do not confirm the hypothesis that group size or traveling with children influences the mode choice significantly. The positive, but not significant correlation between PT use and spendings during vacation at least does not support that PT use is correlated with lower spendings.

The most influential variable on the mode choice of tourists during their stay in South Tyrol is “Guest card received during the vacation” (see Table 4), which underlines the effectiveness of this instrument to increase the share of sustainable transportation at the destination level. This is also visible in the absolute values of model coefficients and the marginal rates of substitution between the influential factors. The odds of reaching the next level of PT use frequency increase by a factor of 2.85 ($\exp(1.049)$) if one receives a guest card (*ceteris paribus*). It may be possible, yet it is practically hard, to compensate for the lack of a guest card in other ways. This would require attracting visitors that stay at the destination multiple times (3 or more) longer than the sample average—a change difficult to achieve given the length of stay has been oscillating around 3–4 nights for the past decades. Another approach could be to attract those visitors who use PT or noncar transportation at home at a frequency 2 levels higher than in the current sample or have a radically more positive attitude toward climate protection—which are measures that are completely beyond the control of destinations and local authorities. On rank 2 to 4, we find variables that describe everyday mobility behavior at home and its link to country-related differences. The duration of stay is ranked at place 5, whereas Table 3 shows that there is an apparent link to rank 1. On rank 6, we find the monthly income with a direct correlation to car ownership and use in European societies. The affective value “liking to travel by car” follows at rank 7. The degree of acceptance of environmental and climate protection follows at rank 8, as the last variable being significant at a 0.01. We completed the

list by the two further variables being significant at a 0.05 level describing the use of the car in everyday mobility and the attitude toward necessity of environmental and climate protection which show a weaker impact on mode choice during a vacation. The overall picture reveals that the environmental attitudes in the list ranked at place 8 and 10 take a lower but still significant impact on the use of PT during the vacation.

6 | Conclusions

The present study analyzes variables from five blocks of factors that may significantly influence the use of public transport by tourists during a vacation. These five blocks regard sociodemographic characteristics, everyday mobility at residence, attitude toward climate-change and environment-friendly behavior, attitude toward cars as means of transportation, and the characteristics of the vacation. Additionally, we included the availability of a guest card, which allows the free use of PT, as a further variable. South Tyrol served as the case destination, offering a PT network and related services (e.g., bike rental) connecting all settlement areas with the main touristic attractions on its territory. By this approach, we take a new perspective, combining the personal and behavioral variables of daily mobility and attitudes with the vacation character, providing a more comprehensive overview.

Furthermore, by focusing on the guest cards including free PT use, we scrutinize an instrument recently introduced by many destinations as a measure of sustainable tourism strategies in addressing the criteria of the GSTC. Prior to the present study, it is rare to find former research comparing the daily mobility behavior of people and during vacation. Holmes, Dodds, and Frochot (2021) studied the general behavior in daily life and compared this with aspects of traveling with a focus on sustainability. However, their study did not directly compare mobility behavior. Zamparini et al. (2022) explicitly compared the share of green mobility at home and during vacation, whereby all

types of destinations and seasons were part of the study. This share was measured by aggregating walking, cycling, and PT. Instead, our study explicitly addresses PT during the summer season. The results add further insights into the general complex research question of tourists' mode choice during vacation.

6.1 | Theoretical Implications

A critical outcome of our study concerns the differences by origin/country. The higher car usage of Italians, compared to higher PT usage of Germans in general and during vacation, indicates that intercultural behavioral differences are a further issue. They are also influenced by differences in the value systems (Schwartz and Cieciuch 2021). Welsch and Kühling (2018) showed that a higher green self image (GSI) measured by the question "She/he strongly believes that people should care for nature. Looking after the environment is important for her/him" in Germany has a significant impact on life satisfaction ($\alpha = 0.01$) while in Italy only a weak impact ($\alpha = 0.1$) could be found. Germans substantially are more concerned about climate change than Italians: while in Germany 77.4% agree, that climate change impacts will be bad in Italy only 69.0% see this issue critical (European Social Survey 2018, 20f). Therefore, the impact of PT use in daily life on use during vacation should be interpreted in the context of the persistent culturally different social values and the quality of PT in a destination. As our study analyzed the behavior for just two European countries, this needs further research looking at the global diversity of the general value of universalism as described by Schwartz and Cieciuch (2021).

Furthermore, we confirmed the role of the duration of stay for the acceptance of PT by the guests. This result can relate to two aspects: First, people with short stays might have different mobility patterns. They either do only a few excursions or have a "bucket list" which demands flexibility with short travel times to explore attractions. In city tourism, with a network of direct connections to subways, trams, or buses, PT is usually the better choice. Considering that the topography of an alpine destination situates all transportation infrastructure along the valleys, it determines that cars and buses use the same roads. Hence, PT only promises advantages for train connections. However, most attractions are not located near train stations, which compensates for the potential travel time advantages of the railway system. This result underlines that further research in the field of the use of sustainable mobility at destination level must consider the type of a destination and the related type of the trip, such as metropolis with a city trip, coastal area with sun and beach tourism, an event place or a wellness resort.

Second, the duration of the stay corresponds to the communications between guests and hosts concerning the guest card. We observed a significantly lower share of tourists who received a guest card among those with shorter stays. This gives rise to two possibilities: that the hosts do not hand the guest cards to short-stay guests or that guests do not ask for the cards because they are not (well)informed. Guests with longer stays might find information about the guest card or receive relevant information from other guests and, therefore, actively request it. This result shows the need for taking a closer look at the information processes among the guests, the destination management and the

hosts. In our study we were focusing on the guests and the five blocks of variables having a potential impact on their mobility behavior. This study revealed that a high share of guests did not receive a guest card or did not remember having received one. Therefore, the role of the hosts as promoters for using PT becomes of interest for future studies.

A further significant result of this study is the impact of tourists' attitudes regarding mobility behavior. On the one hand, there are strong positive attitudes toward cars as a means of transportation, and on the other, their environmental and climate change-related concerns. These attitudes compete in the choice of cars or PT. Our results allow us to conclude that a positive attitude toward cars has a stronger influence than environmental and climate change concerns. Thus, people with strong positive attitudes toward cars tend to push concerns about the negative environmental and climate impact into the background. By this, the estimated coefficients do not reach the same significance level. This adds the aspect of attitudes to the observations of Brock, Williams, and Kemp (2023), who explained the attitude-behavior gap in everyday mobility mainly by functional reasons, as well as the results of Juschten and Hössinger (2021) who identified groups of travelers with different but stable mobility cultures.

This study proves the effectiveness of destination guest cards that include free use of PT as an incentive to increase the share of tourists using sustainable transportation options. This complements the results of Gronau and Kagermeier (2007) who described the key factors for successful public transport provisions focusing on the services offered. However, it also shows the limitations of this instrument in changing the mode choice of the guests with a strong positive affinity toward the car. Therefore, this study also shows that leaving the guests the choice, which means of transport they prefer by offering PT as well as parking facilities near to all touristic attractions clearly limits the increase of PT in general. Aiming at a 100% sustainable mobility of the guests therefore will need measures preventing the persistent car drivers to use it.

6.2 | Suggestions for Practitioners

Our results show that guests having received a guest card, which includes the free use of PT, has a significant positive impact on the use of sustainable mobility options at the destination and, most importantly, the magnitude of this impact exceeds that of any other factor analyzed. Also, this measure is instantaneous, and is actually one of few measures directly under the control of local authorities and policymakers, unlike other strategies (targeting long-stayers or those with a positive attitude toward climate protection). Thus, destination managers who have introduced guest cards with mobility included or intend to do so should focus on the communication between guests and hosts to increase the share of guests who receive the guest card, including PT and being informed about these services by the hosts. The destination management organization (DMO), therefore, takes the central role in providing information for the guests but also continuous training of the staff interacting with the guests. The management of the accommodation sector and the receptionists interacting with the guests are to be made aware of the

importance of sustainable guest mobility to reduce the negative environmental and social impact of tourism and, by this, to increase the acceptance of tourism by the residents.

A further step to improve the promotion of PT at destination level offers the pre-visit communication between the guests and their hosts. Sending a digital guest card before arrival to guests with a booked accommodation with information about the services supports three strategic objectives: First, each guest is actively informed about the guest card. Second, after arrival in the destination the PT services can be used already before the check-in. Third, traveling by train to the destination is supplemented by all PT services from the long-distance train stations to the place of vacation in the destination. Thus, digital solutions for destination guest cards provide opportunities for a significant increase in PT use.

7 | Limitations of Results and Need for Further Research

Even though this study is based on a large sample from two countries, some limitations must be considered. Our dependent variable, the frequency of PT use was self-reported by the study participants on an ordinal scale ranging from never to daily or nearly daily. This information may be imprecise compared to trip logs in a mobility diary, as it does not allow an analysis of overall mobility behavior, particularly the proportion of PT concerning the distances covered. The selected case of the destination South Tyrol, an Alpine region with a comprehensive network and services of PT and good accessibility by car and train for most of its visitors, limits the transferability of the results to geographically comparable destinations. Finally, the findings on intercultural influences on mobility behavior are interesting for Germany and Italy. However, they can potentially indicate even more significant differences for other travel countries. Therefore, future studies could explore the influence of our explanatory factors on our tourist destinations.

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Conflicts of Interest

The authors declare no conflicts of interest.

Data Availability Statement

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

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Appendix A

Variables used in regression analysis and their coding

Variables	Coding
Everyday mobility	
Use of car as driver	1 = never, 2 = less than once per week, 3 = several times per week, 4 = daily or nearly daily
Use of car as passenger	
Use of PT (e.g., local, regional, long distance, or plan)	
Use of individual means of transportation different from car (e.g., e-scooter, scooter, motorcycle, and taxi)	
Use of means of active mobility (e.g., walking, bike, and e-bike)	
Respondents' environmental concerns	
Degree of acceptance of environmental and climate protection even if it leads to personal restriction	1 = very low, 2 = low, 3 = medium, 4 = high, 5 = very high
Degree of conviction that environmental and climate protection are necessary and improve quality of life	
Willingness to adapt their own lifestyle for the sake of environmental and climate protection	
Respondents' attitudes towards cars	
Liking for traveling by car	1 = do not agree at all, 5 = fully agree
Car is essential for leisure activities	
Car is indispensable for everyday life	
Last vacation characteristics	
Last vacation's duration	1 = 1–2 days (1 o.s.), 2 = 2–3 days (2 o.s.), 3 = 3–4 days (3 o.s.), 4 = 5–7 days (4–6 o.s.), 5 = 8–10 days (7–9 o.s.), 6 = 11–14 days (10–13 o.s.), 7 = 15+ days (14+ o.s.)
Spending (per person per day) during last vacation	1 = up to €100, 2 = €100–€150, 3 = €150–€200, 4 = €200+
Group size	Number of people, including the respondent, who went on vacation
Children were present and traveled with the respondent	0 = no, 1 = yes
Guest card was received	0 = no, 1 = yes

Note: Coding of sociodemographic variables is shown in Table 1; o.s. = overnight stay.