The impact of COVID-19 on tourism expenditures: A Quasi-DiD analysis

The Impact of COVID-19 on Tourism Expenditures: A Quasi-DiD Analysis

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Abstract

We investigate the impact of COVID-19 on tourism expenditures by analyzing survey data collected from participants of one of the major amateur cycling races in Italy—the Nove Colli. We gathered information from different types of participants (tourists, residents, day-trippers) about their travel expenses, accommodation, food and beverage, and side goods such as sports equipment. The survey covers three race editions: pre-COVID-19 in 2016, post-lockdown in 2021, and post-COVID-19 in 2022, for a total of 2,734 respondents. Using a quasi-difference-in-differences approach, we find a significant increase in total tourism expenditures due to COVID-19, primarily driven by a substantial increase in side goods expenses, which more than doubled the rise in food and beverage expenses. This result can be partly explained through revenge spending as a form of compensatory consumption behavior and inform policy-makers on how individuals' spending patterns may change in the aftermath of an exogenous shock.

JEL classification: Z32; Z38; L83; Z2; D12

Keywords: COVID-19; Tourism expenditure; Sports tourism; Revenge spending; Quasi-Difference-in-Differences

1. Introduction

Several studies have analyzed the impact of COVID-19 ("CoV19" or "the pandemic," from now on) on the tourism industry in the early stage of the pandemic and immediately after the end of the lockdown (Assaf & Scuderi, 2020; Boto-García & Leoni, 2022; Lee & Chen, 2022). Most of these studies focused on variations in tourism flows or expenditures at an aggregate level (regional or country level). Very little, if nothing at all, is known about the extent of the effect of CoV19 on tourism expenditures at the individual level—including whether, in the year following the pandemic, these expenditures reverted to pre-CoV19 levels.

This lack of knowledge is especially pronounced in the realm of sports tourism—despite this being one of the most hardly affected areas by the pandemic (Ziakas et al., 2021; Frawley & Schuenkorf, 2022; Pedersen, 2022). Similar to other high-contact industries that heavily rely on in-person interactions—including arts, entertainment, and recreation; accommodation and food services—the sports industry has experienced a particularly acute economic fallout during the pandemic compared to low-contact industries—including delivery of services; financial activities (Canton et al., 2021; Dey-Chowdhury et al., 2022). During lockdowns, sports clubs were shuttered, competitions were canceled, and the sales of sports goods and equipment significantly declined, adversely affecting sports careers and employment. Additionally, due to social distancing requirements and travel restrictions, hosting sports events became severely limited, if not entirely prohibited (Skinner & Smith, 2021; Keshkar & Karegar, 2022). Priority was given to sustaining major elite sports events, while most amateur sports events were suspended (Kwiatkowski et al., 2022).

The cancellation of sports events has led to a collective "sports nostalgia," which next boosted sports participants' spending once restrictions were lifted as a form of "vengeance" through consumption (Weed, 2020; Cho et al., 2019, 2021; Cho, 2023). This phenomenon is generally known as "revenge spending;" it was first observed in China in mid-March 2020 and later in other countries (Gupta & Mukherjee, 2022; Lins et al., 2022). Revenge spending involves increased consumption following the reopening of physical stores to compensate for missed opportunities during lockdowns. It is typically associated with hedonic rather than utilitarian purchases, particularly in leisure activities and luxury goods (Boto-García & Leoni, 2022; Park et al., 2022). While existing research has predominantly focused on panic buying—characterized by excessive purchasing of daily essentials at the onset of the pandemic—there remains limited understanding of revenge spending due to a lack of empirical evidence (Malhotra, 2021; Cho, 2023). Our study addresses this gap by providing the first, to our knowledge, empirical evidence of revenge spending behavior in sports tourism.

We investigate the following research question: To what extent has CoV19 affected individuals' tourism expenditures? As related sub-questions, we analyze (i) which type of expenditure (e.g., traveling, accommodation, food and beverage, sports equipment) was mainly affected, and (ii) which type of sports participant (tourist, resident, day-tripper) was the most vulnerable to the pandemic. We are particularly interested in understanding whether individuals' spending returned to pre-CoV19 levels once all the restrictions were lifted and the pandemic

was essentially over in most countries while controlling for sample compositions and inflationary effects. Moreover, we are keen to determine whether the composition of individuals' spending has changed, considering the potential impact that an increase in savings may have had during the pandemic once lockdown restrictions were lifted.

Understanding participants' expenditure in sports tourism has significant relevance for the future of sports tourism and the tourism industry in general. This expenditure directly influences these sectors' profitability (Salgado-Barandela et al., 2021), with any shock in tourism spending due to exogenous events having both short- and long-run implications for global tourism (Henderson & Ng, 2004; Aliperti et al., 2019; Pérez-Granja et al., 2024). Hence, quantifying the dynamic effects of these shocks at the individual level is crucial to understanding past challenges, managing the present ones, and efficiently planning future tourism strategies. This is gaining even greater relevance in sports tourism for two main reasons. First, one of the main objectives of sports events is to contribute positively to the economic development of the host location (Getz, 2008; Saayman & Saayman, 2012; Getz & Page, 2016, 2020; Ramasamy et al., 2022). Secondly, the sports industry has been one of the sectors most affected by the pandemic due to its inherently contact-intensive nature (Kennelly, 2022; Pedersen, 2022).

To address our questions, we designed an original questionnaire and administered it online to the participants of one of the most popular amateur long-distance cycling events that takes place in Italy, in the northern region of Emilia-Romagna (province of Forlì-Cesena and Rimini)—the Nove Colli. This race, which regularly attracts over 10,000 cyclists, is ranked among the top ten Italian long-distance road cycling competitions,[1] and the 25 greatest cycling races across the continent (Müller-Schell, 2012). It is recognized as "one of the most prestigious events of this kind, one of the oldest (held since 1971), and probably one of the most known not only in Italy for this type of competitions" (Mosconi et al., 2015, p.2). The Nove Colli race possesses distinct qualities, such as its historical importance, broad participation among amateur cyclists, and global acknowledgment. These traits make it a relevant case study that can offer valuable insights that, with some caution, may apply to similar events of similar size and type. Importantly for our research, the technical characteristics of this race remained constant across time. This allowed us to compare participants' expenditures across periods without them being influenced by changes in race difficulty or route attractiveness.

We collected a broad set of information from 2,734 participants of different types—tourists, residents, and day-trippers—with a specific focus on their sports tourism expenditures. Specifically, we administered the questionnaire in three race editions held, respectively, before the pandemic (May 2016, "pre-CoV19"; N=841), immediately after the end of the lockdown restrictions (September 2021, "post-lockdown"; N=1,051), and the year following the pandemic when the restrictions were lifted, and the infection rate was at its lowest (May 2022, "post-CoV19"; N=842).

The final, three-wave cross-sectional dataset (N=2,734) allows us to evaluate, for the first time to our knowledge, the extent to which the pandemic impacted tourism expenditures at the individual level, including

whether individuals' spending returned to pre-CoV19 levels once the pandemic was essentially over in 2022. Additionally, it enables an examination of tourism spending within different types of participants and categories of products and services.

Our empirical approach is one of the key features of our analysis. Assessing the CoV19 impact on tourism expenditures is challenging since it requires contrasting actual expenditures in the aftermath of the lockdown period with an estimation of "hypothetical" expenditures that would have occurred in the absence of the pandemic, assuming all other factors remained constant. Such a comparison is not practicable because the pandemic has simultaneously impacted all sectors worldwide with varying intensities. Thus, a pure counterfactual scenario (i.e., to identify a control group immune to the pandemic) does not exist, as is quite often the case (Pérez-Granja et al., 2024).

To address this methodological challenge, building upon prior contributions facing comparable methodological hurdles (e.g., Yang et al., 2017; Zhang & Tang, 2021), we adopt a quasi-difference-in-differences ("quasi-DiD") approach where we use the post-CoV19 period as a synthetic counterfactual, i.e., a proxy for a hypothetical scenario wherein the pandemic had not occurred. The quasi-DiD method was introduced by Nunn and Qian (2011) and later adopted in other research, e.g., within the fields of environmental research (Deng et al., 2021; Zhang and Tang, 2021), energy (Yang et al., 2017), housing (Campbell et al., 2011), and labor economics (Deschamps & De Sousa, 2021). These studies share the same challenge in applying a standard DiD approach due to the violation of one or more of its assumptions, such as the impossibility of strictly dividing the treatment and control groups. Consequently, they have all opted for a quasi-DiD approach. However, they substantially differ in the rationale for its application and therefore in the identification of a counterfactual. Our research advances knowledge on the quasi-DiD methodology by constructing a novel, synthetic counterfactual for the CoV19 period—and it is the first to use this approach in the sports tourism literature. This allows us to objectively evaluate the impact of CoV19 through an identification strategy that resembles a standard DiD approach—when, for obvious reasons, a counterfactual is impossible to observe (see also Pérez-Granja et al., 2024).

After controlling for disruptive factors and adjusting expenses for the effects of inflation, our main finding is that the pandemic led to a significant increase in tourism expenditures, which was mainly driven by a +103.5% rise in expenses for side products (sports equipment, souvenirs), which more than doubled the +45.4% increase in expenses for food and beverage. Instead, traveling and accommodation expenses remained unaffected. This result represents the first, to our knowledge, empirical evidence of revenge spending as compensatory consumption behavior in the aftermath of the pandemic.

The rest of the paper is organized as follows. The next section provides a literature review and then presents the corresponding research hypotheses. The methodology and data section describes the case study, the data and variables, and our empirical strategy. The empirical findings section explains the results from the univariate and

multivariate analyses. Finally, the last section summarizes our research and concludes with some practical implications, limitations, and thoughts for future research.

2. Literature review and hypotheses development

Our research lies at the intersection of two streams of the literature—Sports and Tourism Research—which are strongly intertwined but have largely developed independently (Weed, 2009). In bridging these two streams of the literature, our research contributes to both by providing novel evidence on how CoV19 has affected sports tourists' expenditures.

Several reviews of the literature on the CoV19 impact on sports and tourism have already been published—to name a few see, e.g., Yang et al. (2021), Gössling et al. (2021), Zopiatis et al. (2021), Gössling and Schweiggart (2022), Kennelly (2022), Pedersen (2022). For a comprehensive review of the literature on sports and event tourism, we refer to Hinch and Higham (2001), Getz (1997, 2003, 2008, 2021), Getz and Page (2016, 2020), and Nicolau (2021). Here, we do not seek to provide another thematic review; instead, we outline three main interrelated knowledge gaps and how our research seeks to address them.

2.1. COVID-19 impact on tourism expenditures

Previous studies in Tourism Research have paid particular attention to the CoV19 effects on the tourism industry and participation (e.g., Boto-García & Leoni, 2022; Provenzano & Volo, 2022; Álvarez-Díaz et al., 2023; Vayá et al., 2023). However, Zopiatis et al. (2021) and Gössling and Schweiggart (2022) point out that many publications are characterized by descriptive approaches, failing to provide rigorous causality inferences. Also, little quantitative research is available regarding individuals' actual behavior as tourists and consumers, neither during nor after CoV19 (Yang et al., 2021). Overall, unambiguous empirical evidence on CoV19 effects on tourists' expenditures is still missing. This empirical gap—which we seek to fill in our study—is problematic because any exogenous shock (global pandemics, terror attacks, wars, natural disasters) affects individuals' tourism spending, with consequent economic vulnerabilities, including changes in competitiveness degrees and price levels—all with great relevance for the future of the tourism industry.

2.2. COVID-19 impact on sports tourism

Despite the significant number of tourism-related CoV19 papers that have appeared over the past years (Gössling & Schweiggart, 2022), little empirical evidence, if anything, has been provided about the CoV19 impact on sports tourism (Kennelly, 2022; Pedersen, 2022). Specifically, no prior studies to our knowledge evaluated whether, how much, and which type of tourism expenditures have been affected by the pandemic.

In the literature on Tourism and Sports Economics, some studies analyzed the CoV19 impact on specific aspects related to sports, e.g., athletes' intentions for future race participation (Maditinos et al., 2021), residents' perceived social impact of a post-CoV19 professional cycling event (Vegara-Ferri et al., 2021), psychological

and economic impacts on fans of living without live sport (Lock & Reghunathan, 2022). However, none to our knowledge has thus far empirically analyzed the CoV19 impact on the tourism economy generated by sports events.

A few studies discussed the harmful CoV19 effects on sports events, hence on the sports tourism industry as a whole, but lack any empirical analysis (e.g., Nhamo et al., 2020). Other studies have evaluated the economic impact of sports events in local communities but not whether this impact was affected by CoV19 (Cannon & Ford, 2002; Daniels & Norman, 2003; Desbordes, 2007, 2009; Drakakis et al., 2021). Other contributions have examined the initial impact of CoV19 on sports at all levels but not its aftermath effects (Frawley & Schulenkorf, 2022; Kwiatkowski et al., 2022; Pedersen, 2022).

Addressing the knowledge gap regarding the effects of CoV19 on sports events is crucial because active participation in such events generates national and international tourism, which boosts the host destinations' economy (Gibson et al., 2005; Fourie & Santana-Gallego, 2011). Sports events such as cycling, running, and open-water swimming races have a crucial tourism value, wherein sports consumers' expenses can be regarded as a recurring annual revenue source for the host community (Barquet et al., 2011; Saayman & Saayman, 2012; Getz & McConnell, 2014; Rejón-Guardia et al., 2018; Nicolau et al., 2019; Maditinos et al., 2021).

Our research addresses the gap in the pandemic's effects on the economic dynamics of sports event-driven tourism by considering a road cycling race as a case study (more details in Section "The case study: The Nove Colli race"). More and more cyclists travel to participate in competitions, contributing to developing domestic and international tourism (e.g., Bull, 2006; Downward et al., 2009). To help sports event organizers and the host destination maximize the economic impact of the events and to develop better-tailored sports tourism services, it is essential to understand participants' spending patterns (Wicker et al., 2012), including whether and how much these patterns have been affected by CoV19.

2.3. Revenge spending

Prior research has mainly described the negative CoV19 impact on tourism and sports in the early stage of the pandemic or immediately after the end of the lockdown (Gössling et al., 2021; Vayá et al., 2023). Yet, very little is known about tourism expenditures in the post-CoV19 era (Yang et al., 2021). The question is whether individuals' tourism spending has resumed to the pre-CoV19 level, or their spending behavior has changed. In addressing this knowledge gap, our research also contributes to the strand of studies on compensatory consumption, as described in this paragraph and the next sections.

Existing literature has shown that exogenous shocks (financial crises, terror attacks, wars, pandemics) can cause temporary or persistent changes in individuals' consumption patterns (Nigg, 2011), including an increase in savings at the expense of consumption while taking into consideration the impact of inflation (Borowski & Jaworski, 2023). In 1996, Crang proposed the expression "consumption displacement" to refer to temporal or geographical changes arising from major unexpected events. This theoretical framework has been later applied in

several tourism analyses, revealing shifts in consumption patterns during and in the aftermath of CoV19 (Deyá-Tortella et al., 2022; Park et al., 2022). In many countries, different consumption patterns have been detected as a direct result of CoV19, including compulsive, impulsive, panic, and revenge buying (Lins et al., 2022). This consumption pattern has been generally accompanied by a higher saving rate.

The latter two were the most prominent (Gupta & Mukherjee, 2022). Panic buying—observed at the beginning of the pandemic—occurs when people buy more things than usual related to daily essentials, such as canned food, toilet paper, or other hygiene products. Revenge spending was first reported in mid-March 2020 in China and later observed in other countries when the physical stores were reopened, especially luxury products stores (Liu et al., 2023). This concept is meant to capture individuals' desire to consume and travel more to compensate for the missed opportunities caused by lockdowns (Lins et al., 2022; Kim et al., 2022; Park et al., 2022), especially those who were more severely affected by the pandemic (Boto-García & Leoni, 2022).

Unlike panic buying, revenge spending is generally related to leisure activities and hedonic rather than utilitarian shopping, i.e., the purchase of high-price and bulk goods for personal pleasure regardless of their necessity or immediate use (Babin et al., 1994; Malhotra, 2021; Michael & Fusté-Forné, 2022). In the realm of sports tourism, hedonic-type consumption includes products related either to the sports event itself (t-shirts, mugs, badges, other merchandising products) or the location of the event (city souvenirs; Koenig-Lewis et al., 2018; Gârdan et al., 2020).

The cancelation of sports events has led to collective "sports nostalgia," which has boosted sports participants' expenses once restrictions were lifted away, as a gift to themselves to obtain compensation and "vengeance" through consumption (Weed, 2020; Cho et al., 2019, 2021; Cho, 2023).

However, the current studies on consumption behavior during exogenous shocks have primarily focused on panic buying (Park et al., 2022). Instead, revenge spending is a relatively new concept, which has been thus far emphasized mainly by the media but has still to be sufficiently analyzed in academic research. While some researchers have just *suggested* the presence of revenge spending in the post-pandemic period, there is still no consensual definition of revenge-buying behavior, and very little is known about this phenomenon because of the absence of any clear empirical evidence (Lins et al., 2022; Malhotra, 2021; Cho, 2023). Our research addresses this knowledge gap by providing the first, to our knowledge, empirical evidence of revenge spending behavior in sports tourism.

2.4. Hypotheses development

What would we expect the data to show based on prior literature? Some empirical evidence shows adverse CoV19 effects on tourism and sports events (Gössling et al., 2021; Gössling & Schweiggart, 2022). Hence, we could ex-ante predict a generic decrease in individuals' expenditures due to, for instance, concerns about the future. However, this evidence is *weak* since it is mainly based on descriptive approaches (Yang et al., 2021); *scant*, especially in the realm of sports tourism (Nhamo et al., 2020; Weed, 2020); and *controversial* when it

comes to the post-CoV19 period, wherein compensatory consumption mechanisms emerged as a possible aftermath of the pandemic (Park et al., 2022). In the presence of revenge spending, we could instead expect an increase in some individuals' tourism expenses, particularly those related to leisure services and hedonic products (Wang & Xia, 2021; Cho, 2023).

However, there still needs to be a consensus about the definition of revenge spending and its significance because empirical evidence is thus far scant. Previous literature mentioned two main streams for shopping motivations: hedonic and utilitarian values (Babin et al., 1994; Wagner & Rudolph, 2010; Scarpi et al., 2014). Hedonic shopping means consumers purchase goods and services for personal pleasure regardless of necessity. In contrast, utilitarianism is related to efficiency and rationality, meaning that people buy certain products because of their necessities. However, when it comes to sports events, it is admittedly difficult to distinguish hedonic vs. utilitarian shopping, mainly because participating in a sports event is, per se, a hedonic consumption (Getz & McConnell, 2014; Gârdan et al., 2022). In turn, all the associated expenses could be thought of as hedonic. If any categorization is needed, we could assume that all expenses for side goods, e.g., souvenirs, official race merchandising, and other sports equipment, would be covered as hedonic. Also, some food and beverage expenses, e.g., bars, restaurants, and drinks, could be categorized as hedonic. Instead, expenses on travel, accommodation, and food (in its strict meaning) could be categorized as utilitarian, given their necessity.

Given the current state of knowledge, the most reliable hypothesis we could advance is that CoV19 led to an overall decrease in individuals' tourism expenditures and a marginal increase in hedonic shopping. In our specific case study, this later could include expenses on side goods and, possibly, some food and beverage (bars, restaurants, drinks)—while excluding expenses on travel, accommodation, and food in its strict sense—which could all be instead categorized as utilitarian shopping.

However, we shall refrain from stating precise hypotheses: the scant and controversial empirical literature, along with no consensual definitions of revenge spending nor hedonic vs. utilitarian shopping for sports tourism, favors an inductive over a deductive approach. That is, we directly read the spending patterns from our data without imposing any prior hypotheses about what they should be.

3. Methodology and data

3.1. The case study: The Nove Colli race

The Nove Colli is one of the most prestigious amateur long-distance cycling races (commonly referred to by the Italian term "Gran Fondos," which roughly translates into English as "Big Rides"), one of the oldest (held since 1971) and most popular not only in Italy (Müller-Schell, 2012; Mosconi et al., 2015). This race attracts several thousands of tourists annually. Despite its relevance for the sports and tourism sectors, prior contributions to our knowledge have yet to use data from this race for economic analysis in these fields.[2]

The race takes place yearly in Italy, in the northern region of Emilia-Romagna (province of Forlì-Cesena and Rimini), with the starting grid and finish line in Cesenatico. It is only open to amateur cyclists with a valid medical certificate for road cycling competitions, and consists of two routes (short route 130km; long route 200km).[3]

In this research, we analyze participants' tourism-related expenditures in three race editions: the 46th, 50th, and 51st editions, which were respectively held before the pandemic (May 22, 2016), after the end of the lockdown (September 26, 2021),[4] and in the post-CoV19 period (May 22, 2022). Table 1 presents a comprehensive overview of the technical characteristics of the 46th, 50th, and 51st editions of the Nove Colli race, providing key data points that support our analysis of participants' tourism-related expenditures across these editions. Indeed, the consistent technical aspects of the race across these editions, including route length and total uphill gradient, ensure that variations in tourism expenditures are not confounded by changes in race difficulty or route attractiveness.

TABLE 1 HERE

3.2. Data and variables

Data were collected using an original online questionnaire in Italian and English. The invitation to participate in the questionnaire, including the link to it, was sent to each participant's registration email address by the Nove Colli secretariat, with a recall after three weeks. Participants were informed that the information collected through the questionnaire is anonymized, only used for statistical purposes, and analyzed in compliance with the GDPR (EU Regulation 2016/679).

The questionnaire was administered in three race editions: pre-CoV19 in Spring 2016 (N=841, response rate=8.2%), post-lockdown in Fall 2021 (N=1,051, response rate=11.7%), and post-CoV19 in Spring 2022 (N=842, response rate=10.7%), for a total of 2,734 respondents. The approximate time to complete the questionnaire ranged between three to ten minutes. In collaboration with the Nove Colli organizing team and their sponsors, we incentivized participants to complete the questionnaire.

The questionnaires were similar, hence comparable across editions, though some questions changed through the years to include CoV19-related information and accommodate newly-occurred requests from the race organizers. In general, the structure of the questionnaire comprises the following main parts:

- Personal details (e.g., gender; age; current occupation; Italian region or country of origin);
- Participation information (e.g., participant type; number of prior participations);
- Characteristics of accommodation and trip (e.g., number of overnights; lodge type; means of transport);
- Tourism- and race-related expenditures;
- Participants' opinions about the race and the host; factors affecting their decision to participate.

For the purpose of this research, we selected a set of variables from the questionnaire, namely those related to the type of expenditures incurred by participants, and some participant demographics. These variables are described in Table 2, which also provides means and standard deviations for the pooled sample.

TABLE 2 HERE

Data collection targeted a diverse participant base at the Nove Colli race, revealing a broad spectrum of demographic and economic profiles (see Table 2). The sample comprises 2,734 respondents, with the majority identified as tourists (88.9%) who spent at least one night in the event's host destination or nearby—revealing the race's significant appeal as a tourist attraction. This was followed by day-trippers (6.4%) and residents (4.7%). The demographic composition was predominantly male (93.9%), with an average age close to 49 years. A small proportion of respondents (6.1%) reported living abroad, outside Italy, a point further discussed in the concluding section.

Regarding occupation, the majority were private employees (53.8%), followed by self-employed individuals (22.0%) and public employees (13.2%). A small percentage reported being retired (8.4%), unemployed (1.2%), students (0.7%), or falling into other categories (0.6%). This diversity in employment status suggests a participant group with varied economic capacities contributing to the local economy. On average, respondents had attended approximately five race editions, indicating sustained interest in the event.

In terms of expenditure patterns, the average daily expenditure per person was €308.1 ("Equivalent Expenditure" in Table 2). The average total expenditure of €1,041.6 includes travel, food, lodging, and race-related expenses, also considering the expenses incurred for accompanying individuals that fall under the same budget. On average, daily spending on food and beverages amounted to €50.3 per person, accommodation costs per night to €66.1 per person, and travel costs to €115.6, further contributing to the local economy. Notably, average side expenses, which sum up expenses on sports equipment, clothing, souvenirs, and merchandise, were €307.3.

In our analysis, these "Type of expenditures" variables as described in Table 2 constitute our dependent variables. To ensure comparability of expenses over time, in applying our quasi-DiD approach, expenditures were adjusted for inflation (using the annual inflation rate provided by the Italian National Institute of Statistics – Istat). As independent variables and controls, we use the variables "Type of participant" (residents, day trippers, and tourists) and "Other characteristics," including gender, age, occupation type, participant nationality (Italian or foreign), and the number of race editions in which the respondent has taken part.

3.3. Empirical strategy

Our primary aim is to assess the impact of CoV19 on tourism expenditures, employing a quasi-DiD (Difference-in-Differences) approach. To elucidate our methodology, we introduce the conventional DiD

approach—a widely utilized econometric technique for gauging the effects of a specific event or treatment on a targeted outcome. This method facilitates a comparative analysis between a group exposed to the event (the treatment group) and an unexposed control group. By leveraging this comparison, the DiD method endeavors to estimate the causal effect of the event.

Ideally, observations span two distinct periods: pre-treatment (before the event) and post-treatment (after the event). Let's consider the following variables:

- $Y_{T,\ POST}$ and $Y_{T,\ PRE}$: Average outcome variables observed for the treatment group post-program and pre-program.
- $Y_{C,\ POST}$ and $Y_{C,PRE}$: Average outcome variables observed for the control group post-program and pre-program.

The difference $Y_{T,\ POST}$ - $Y_{T,\ PRE}$ = ΔY_T quantifies the combined effect of the event and the general trend between the pre- and post-periods. Conversely, $Y_{C,\ POST}$ - $Y_{C,\ PRE}$ = ΔY_C measures only the trend between these periods for the control group, given that it was not exposed to the event.

Under the assumption of parallel trends—indicating that the treatment and control groups would have followed similar trends over time without the event—we can calculate the difference between the two differences, $\Delta Y_T - \Delta Y_C = \Delta Y$. This ΔY serves as the DiD estimate and can be interpreted as the event's effect on the tested outcome variable once the general trend is accounted for.

Measuring the impact of the CoV19 pandemic on sports tourism expenditure is a complex task that requires a multifaceted approach. This is because of the various constraints and limitations of the research problem when compared to the standard DiD. Due to these limitations, we deviate from the standard DiD approach. Ideally, we would compare actual expenditures after the end of the lockdown with an estimation of what spending would have occurred *in the absence of the pandemic*, assuming all other factors remained constant. However, such a comparison is not feasible because the pandemic is unprecedented and has affected all sectors of the global economy with varying intensities. This makes it impossible to identify an immune control group.

Several prior contributions face similar methodological challenges. For instance, Nunn and Qian (2011), Yang et al. (2017) and Zhang and Tang (2021) addressed these issues by adapting the standard DiD method to fit specific characteristics of their empirical contexts, resulting in a quasi-DiD approach. In these studies, the authors relaxed, with different nuances, the strict distinction between treatment and control groups required in standard DiD analyses. Similarly, our quasi-DiD design deviates from the standard DiD method in that we assume the post-COVID-19 year (2022) best approximates what would have happened in 2021 had the pandemic not occurred. In other words, we posit that 2022 serves as a valid counterfactual for 2021. This represents a shift from the traditional "counterfactual in space" approach, commonly seen in standard DiD applications (e.g., comparing two countries), to a "counterfactual in time" approach (comparing different points in time).

This strategy allows us to explore the CoV19 effect even if a "clean" counterfactual is unobservable. This estimation strategy shares most of the advantages and potential pitfalls of the standard DiD estimators (Nunn and Qian, 2011). One critical assumption underlying this method is the absence of other events beyond those controlled for that may have occurred during the analyzed periods, influencing tourism expenditures. In our analysis, we account for disruptive factors and adjust expenses for inflation. Still, given the unprecedented and multifaceted impact of the pandemic on various sectors and regions, we must approach this assumption with caution and acknowledge its inherent potential limitations. We delve deeper into this issue in the concluding section.

Our quasi-DiD approach entails three steps. As the *first step*, we estimate the change in spending between the pre-CoV19 and post-lockdown periods and refer to it as the Average Treatment Effect for the treated group (ATE^T). This ATE^T is the empirical counterpart of ΔY_T in the description above and estimates the combined effect of CoV19 and the general trend between the pre- and post-periods. To estimate ATE^T, we control for possible confounding factors, including participant compositions, inflation (since all expenses are expressed in real terms), and other economic conditions described in the previous section and Table 2. As the pre-CoV19 and post-lockdown samples are potentially unbalanced and heterogeneous, three econometric techniques are employed to calculate the ATE^T. These include regression adjustments, nearest-neighbor matching, and propensity-score matching.

Regression adjustments estimate the change in expenses before and shortly after CoV19 while considering the impact of other factors (control variables) through a standard regression approach. Differently, nearest neighbor matching is a statistical method to find the closest match between two sets of observations (Rubin, 1973, 1977; Abadie & Imbens, 2006, 2011). It is a way to find the closest "neighbor" to a given observation based on similarity measures, e.g., Mahalanobis distance, calculated in the control variables space. We match the pre-CoV19 and post-lockdown observations based on the control variables. This matching process can be represented as:

$$D_i = \text{argmin}_j \text{ distance}(X_{PRE,i}, X_{POST,j}),$$

where D_i denotes the matched observation for the i-th pre-CoV19 observation, X_i represents the vector of control variables, and distance represents a measure of similarity, such as Mahalanobis distance. Once the matching process is complete, we proceed to compute the difference in expenses between the matched observations.

Propensity-score matching is similar, but matches are made on propensity scores obtained by estimating logit models for the post-lockdown dummy, where the control variables are used as independent variables (Rosenbaum & Rubin, 1983; Abadie & Imbens, 2012). Formally,

$$D_i = \text{argmin}_j |P(X_{PRE,i}), P(X_{POST,j})|,$$

where P(.) indicates a propensity score calculated as a function of the X vector of control variables.

The three approaches often yield similar results, and this holds true in our empirical analysis. While considering control variables reduces the risk of the results being driven by idiosyncratic characteristics of the samples, the estimated ATEs are only partial representations of the causal effect of CoV19 on tourism expenditure due to the possibility of other unobserved factors influencing expenditure during the two periods. So, we need to take further steps to provide a reliable estimate of the impact of the pandemic.

As the *second step*, using similar econometric techniques, we estimate the change in spending between the pre- and post-CoV19 periods, and refer to it as the Average Treatment Effect for the control group (ATE^C). This ATE^C is the empirical counterpart of ΔY_C and estimates the general trend between the pre- and post-periods. Note that the biggest deviation from the standard DiD approach is in estimating ATE^C. We assume that the post-CoV19 year best approximates what would have happened in 2021 without the pandemic. So, we assume here that our ATE^C measure is ideally unaffected or only negligibly affected by CoV19.

As the *third and final step*, we calculate the difference between ATE^T and ATE^C, which allows us to estimate the change in spending that can be explicitly attributed to CoV19. This difference is the empirical counterpart of ΔY and can be interpreted as the effect of CoV19 on the outcome variable. In simple terms, our quasi-DiD approach innovates by using the post-CoV19 period as a synthetic counterfactual.

4. Results

4.1. Univariate analysis

Table 3 provides descriptive statistics of the variables used in our analysis differentiated by race edition, along with related balance tests. These balance tests investigate the similarity of variables across different editions to ensure valid comparisons in our analysis across editions and suggest employing matching techniques in case of imbalance. On average, the Total Expenditure amounted to 1,042 euros (Table 2) over the three editions, with statistically significant differences between editions (Table 3).

Notably, total expenditures substantially increased after the pandemic. However, compared to the pre-CoV19 period, the increment observed in the post-lockdown period (column Δ(b-a), Table 3) is considerably more substantial than in the post-CoV19 period (column Δ(c-a), Table 3). Similar trends result in equivalent expenditure (averaging around 308 euros, Table 2), but notable differences emerge across race editions, as highlighted by the comparison between the last two columns of Table 3.

To examine the CoV19 impact on hedonic and utilitarian shopping, we analyzed the expenses incurred for accommodation, food and beverage, travel, and side goods. Although an increase in expenditure is evident in the post-lockdown period (column Δ(b-a), Table 3) compared to the post-CoV19 period (column Δ(c-a), Table 3), our analysis reveals that these increases are significantly more relevant for hedonic categories (i.e., side expenses). In contrast, the increases in utilitarian expenditures, such as accommodation, are not statistically significant.

TABLE 3 HERE

While expenses on various items have generally increased if compared to the pre-pandemic period, it would be inaccurate to attribute these changes solely to the CoV19 effects. As seen in Table 3, there has also been a significant change in the sample's composition.

Table 2 reveals that tourists represent the highest percentage of respondents (88.9% of the whole sample), followed by day-trippers (6.4%) and residents (4.7%). Table 3 further shows that while the percentage of tourists has remained statistically stable across race editions, the proportion of residents statistically increased while the proportion of day-trippers decreased after the pandemic. Respondents from foreign countries represent 6.1% of the sample, significantly declining after the pandemic. Detailed statistics about respondents' country and region of origin across the three race editions are respectively reported in Tables A5 and A6 in the Appendix. These tables illustrate that the majority of respondents were Italians (93.79%), mostly from Emilia-Romagna (16.93%) and Lombardia (18.62%). In the next section, we adjust our estimates for the changes in sample composition, thus providing a more accurate assessment of the CoV19 impact.

4.2. Multivariate analysis

We start our multivariate analysis by analyzing the whole sample. Table 4 displays the Average Treatment Effect for the whole sample. Specifically, Panel A provides expenditure levels and variations between 2021 and 2016 (post-lockdown vs. pre-CoV19), while Panel B illustrates expenditure levels and changes between 2022 and 2016 (post-CoV19 vs. pre-CoV19). Excluding the column listing the type of considered expenses, the first numerical column contains the Average Treatment Effect (ATE^T in Panel A and ATE^C in Panel B). The second column displays pre-CoV19 spending levels, while the third and fourth columns represent post-lockdown (Panel A) or post-CoV19 (Panel B) spending levels without adjustments and the percentage changes from the pre-Covid edition, respectively. Column 5 represents post-lockdown (Panel A) or post-CoV19 (Panel B) spending levels, including adjustments to align sample comparability and mitigate inflation effects. Column 6 illustrates the percentage variation from these adjusted expenses compared to their respective pre-Cov19 levels. Finally, the seventh and last column depicts the bias arising when expenditure percentage variations do not include adjustments for inflation and sample comparability.

Here is the logic behind Table 4. The pre-CoV19 equivalent expenditure amounted to 188 euros (Table 4, second column); during the post-lockdown period, it increased by 46.7%, reaching 275 euros (Table 4, panel A, columns 3 and 4). As we mention in the methodological section, this increase may be due to CoV19, but also to various effects related to the changes in the sample compositions and the inflationary impact. To reliably estimate the CoV19 impact on expenditures, we need to purge these confounding effects. To this aim, we carry on the three-step procedure described in the Section "Empirical strategy."

As the *first* step, we use three matching methodologies (regression adjustments matching, nearest-neighbor matching, and propensity-score matching) to adjust the post-lockdown estimates for the sample's composition and inflation and calculate the ATE^T. This makes the pre-CoV19 and post-lockdown average expenditures

comparable. The three matching methodologies produce comparable results, as shown in Table A4, which reports, as an example, the ATE^T and ATE^C values for Equivalent Expenditure and Total Expenditure using the three different approaches. Hence, we use the regression adjustments approach for computational efficiency in the rest of the paper. After controlling for confounding factors (i.e., gender, age, nationality, occupation, number of persons per budget, past participation in the race) and the inflation rate during the period analyzed (source Italian National Institute of Statistics – Istat), we obtain a post-lockdown average expenditure of 242 euros (i.e., a 28.9% increase; Table 4, panel A, columns 5 and 6). This is far lower than the unadjusted increase of 46.7% estimated above (Table 4, panel A, column 4). Without adjusting for inflation and sample composition, we would estimate a nominal growth based on non-comparable samples and end up with a bias of 17.8% (46.7% − 28.9%) (Table 4, panel A, column 7). Of the 28.9% increase, a part is possibly due to CoV19, while the rest is due, among other factors, to unobservable structural changes in consumer preferences and spending capacity. To clearly define the CoV19 effect on expenditures, we need to control for these unobservable factors as well.

To provide such control, we perform the *second* step along the line mentioned in the methodological section. To precisely isolate the CoV19 impact on expenditure, the ideal approach would be to compare an expenditure with the same expenditure observed for a comparable sample unaffected by CoV19. Since the pandemic has affected all economies worldwide, it is not possible to identify a valid counterfactual. We create a synthetic counterfactual to overcome this problem, assuming that the post-CoV19 year best approximates what would have happened in 2021 without the pandemic. Then, we estimate the increase between the pre-CoV19 and post-CoV19 periods, adjusting for inflation and sample composition (Table 4, panel B). Indeed, compared to the pre-CoV19 period, the post-CoV19 period records an equivalent average expenditure of 202 euros (a 7.6% increase; Table 4, panel B, column 5). Ideally, this variation, which we refer to as ATE^C, does not include the CoV19 effect or, at least, it is less influenced by it. So, we assume that our ATE^C estimate is unaffected or only negligibly affected by CoV19.

Finally, as the *third* step, by comparing the ATE^T (28.9%) and ATE^C (7.6%), we estimate that approximately 21.3% (28.9% − 7.6%) of the increase in equivalent expenditure is due to CoV19, which represents an estimate of what the literature refers to as revenge spending.

Table 5 shows the effects of the increases in expenditures due to revenge spending across all spending categories and by various categories of participants. For example, total spending increased by 31.8% between the pre-COV19 and post-lockdown periods, and by 13.7% between the pre-CoV19 and post-CoV19 periods. A similar pattern holds for equivalent expenditure. Table 5 uses the estimates reported in Table 4 to estimate revenge spending by differencing the ATE^Ts and ATE^Cs for all categories of expenses and subgroups of participants (i.e., tourists, residents, and day-trippers).

A joint reading of Tables 4 and 5 provides an overview of utilitarian versus hedonic spending. While utilitarian spending mainly remained unchanged, hedonic spending drove the increase in overall expenses. As a utilitarian

expense, accommodation did not determine any rise due to CoV19. Travel expenses increased significantly in both periods (Table 4), but this increase was not due to CoV19 but rather to other factors (Table 5). Hedonic expenses had a different pattern, with a particularly pronounced increase observed in the post-lockdown period. Compared to the pre-lockdown period, while the rise in side expenses was +134% in the post-lockdown period (Table 4, Panel A), their increase was more nuanced in the post-CoV19 (+30%; Table 4 Panel B). Regarding restaurant spending, the increase observed in the post-lockdown period (+54%) is higher than the increase in the post-CoV19 (+8.3%). In line with the literature, the effect of revenge spending (Table 5) was predominantly observed for hedonic expenses related to side goods (+104%), which more than doubled the rise in food and beverage expenses (+45.4%).

Both tourists and residents have recorded an increase in expenses due to CoV19 (Table 5). Instead, day-trippers maintained their pre-CoV19 spending level. However, their spending composition changed in line with the revenge spending hypothesis, with the highest proportion of spending directed toward side goods.

TABLES 4 and 5 HERE

5. Discussion and conclusions

5.1. Summary and discussion

This research aims to explore the CoV19 impact on individuals' tourism expenditures. We gathered survey-based data from the participants of one of the most popular amateur road cycling events in Italy (Forlì-Cesena and Rimini provinces in the Emilia-Romagna region), the Nove Colli race (Müller-Schell, 2012; Mosconi et al., 2015). We administered the questionnaire for three editions—the 46th, 50th, and 51st—which were respectively held before the pandemic (May 22, 2016), after the lockdown (September 26, 2021), and in the post-CoV19 period (May 22, 2022). We are particularly interested in evaluating whether individuals' spending behavior has resumed to the pre-CoV19 level once all the restrictions were lifted away; or, instead, if there is any consumption displacement (Deyá-Tortella et al., 2022).

We analyze which type of tourism expenditures (traveling; accommodation; food and beverage including bars, restaurants, drinks, food; side expenses) and which type of sports participant (tourist; resident; day-tripper) have been mainly affected by CoV19. Building upon the literature on shopping motivations (Babin et al., 1994; Wagner & Rudolph, 2010; Scarpi et al., 2014), we distinguish between hedonic expenses, such as those associated with restaurants, drinks, and side purchases (e.g., related to merchandising, souvenirs, etc.), and utilitarian expenses, such as those related to travel and accommodation.

We adopt a quasi-DiD approach, which allows us to compute the change in sports tourism expenditure due to CoV19 in the absence of a standard counterfactual scenario. We also consider sample and inflation adjustments, and control for other economic factors and respondents' characteristics.

Our key finding is that the pandemic led to a significant increase in total tourism expenditures (+18.1%), driven by a substantial increase in hedonic shopping on side goods (+103.5%), which more than doubled the rise in food and beverage expenses (+45.4%). Instead, utilitarian expenses on traveling and accommodation remained unaffected.

Regarding the sports participant categories, we find that tourists' and residents' spending patterns increased due to CoV19, while day-trippers maintained (or increased less significantly) their pre-CoV19 spending level. The resilience of day trippers' total expenditures against CoV19 might be attributed to recent evidence suggesting that day trippers are less likely to be concerned about the pandemic, having a reduced perceived risk of it (Jones & Nguyen, 2021). Broadly speaking, day trippers' activities tend to be more concentrated in both space and time than those of tourists and residents due to a restricted time budget (Stetic et al., 2011; Fernández et al., 2016). As pointed out by Su et al. (2020), the longer duration spent at the event by tourists and residents could be linked to a greater enjoyment of the experience, which increases their level of satisfaction, and, consequently, their total expenditures—as can be inferred from our findings, particularly in the aftermath of the pandemic as a result of revenge spending. In our case, day trippers might be particularly focused on the sports performance, arriving for a single day just to participate in the race without spending additional time or money exploring around. Their approach to the sports event differs from that of tourists and residents, who not only participate in the race but also engage in enjoying the host destination. This explanation, which lacks proper empirical support, calls for further evidence about the mechanism underlying the spending behavior of different types of sports participants, and their choices regarding staying only for the day versus overnight.

Our results stand in contrast to the predominant, negative view of CoV19 on the tourism industry (Yang et al., 2021; Vayá et al., 2023) and provide supporting evidence for the phenomenon of revenge spending in the aftermath of the pandemic (Park et al., 2022; Cho, 2023)—with the proviso that expenses on side goods, and tentatively on food and beverages, can be categorized as hedonic rather than utilitarian (Koenig-Lewis et al., 2018; Gârdan et al., 2020).

5.2. Policy implications

Our findings have important implications for sports tourism. First, the increase in individuals' expenses in the aftermath of an exogenous shock highlights the benefits of hosting sports events as part of a sports tourism recovery plan. Therefore, efficient coordination between sports organizations and hosting destinations is crucial for scheduling sports events after industry and consumption disruptions, to recover from missed events and regain lost revenues and business. To this aim, our findings suggest that providing more hedonic products and services such as sports equipment and tourism souvenirs can substantially increase revenues if compared to supplying utilitarian goods.

Secondly, it is important to discern the composition of sports event participants, because it can yield different economic returns to hosting destinations and sports organizations. Our results show that tourists' and residents'

spending behavior was responsive to CoV19, but not that of day-trippers. To maximize revenues, sports and tourism managers should collaborate to identify those sports consumers who are more vulnerable to shocks or disruptions, thus proposing services, products, and promotional initiatives targeted to these specific participant categories.

5.3. Limitations and future research

Even though our study provides several significant implications, certain limitations still call for further research. First, this research is confined to Italian sports tourism and specifically to an amateur cycling race. Due to the different impacts of CoV19 across countries and sports types, there may be different CoV19 effects as we look at different countries and sports. While our findings could potentially be generalized to other events comparable to the NoveColli race (i.e., other major mass cycling events), this ultimately remains a question for future empirical research.

Secondly, our questionnaire does not allow us to distinguish hedonic vs. utilitarian shopping clearly. We asked participants about their food and beverage expenses, which included bars, restaurants, drinks, and food. Though spending in bars, restaurants, and drinks could be associated with feelings of pleasure (hence, hedonic), spending on food in its strict sense could be instead considered as a mere survival necessity (hence, utilitarian). Future research should clearly separate hedonic vs. utilitarian products to identify the presence of revenge spending better.

Thirdly, understanding expenditure patterns based on participants' country or region of origin is pivotal for this type of analysis. Unfortunately, in our case study, the proportion of responses from foreign participants across the three race editions (6.14%) is insufficient for creating distinct domestic and foreign subsamples. While our quasi-DiD approach can be applied to the domestic subsample, yielding similar results to the entire sample, it faces convergence issues when applied to the foreign subsample due to the limited number of observations. Looking ahead, this prompts the need for more nuanced explorations of sample subdivisions, e.g., by pursuing more balanced percentages of domestic and international respondents.

Fourthly, we employ a synthetic counterfactual approach to address the challenge of the absence of a "clean" counterfactual. This involves assuming that the post-CoV19 year (2022) is the best approximation of what would have occurred in 2021 without the pandemic. Given the unpredictable and multifaceted impact of the pandemic across sectors and regions, we must cautiously approach this assumption and acknowledge its potential limitations. It is plausible that the spending trends in the post-CoV19 year (2022) may not solely reflect pre-CoV19 patterns, as post-CoV19 effects could still influence consumer behavior. Hence, while this counterfactual assumption is pivotal to our approach, it may face criticism and remains subject to scrutiny, as is common in any causal inference studies. Replication efforts using alternative counterfactuals are necessary to ensure the robustness of our findings. For instance, future analyses based on richer datasets could delve into other factors

that likely shaped individuals' tourism spending, such as the situation of family savings before and after the pandemic.

Finally, this research is a preliminary step in understanding how individuals' tourism expenditures have changed due to CoV19. Will these changes remain stable in the following years? Future studies should continue monitoring an ever-changing sports tourism industry.

Notes

[1] See the ranking "Top 10 Italian Gran Fondos for 2017" published in the Gran Fondo Guide website. Retrieved from https://www.granfondoguide.com/Contents/Index/1365/top-10-italian-gran-fondos-for-2017. (Last accessed: April 2024).

[2] A few studies in the medicine literature have used data from the Nove Colli (e.g., Roi & Tinti, 2014).

[3] For further details, see, e.g., Roi and Tinti (2014) and the official race website at https://www.novecolli.it/en-GB (last access: April 2024).

[4] The race was halted in 2020 due to the CoV19 pandemic and postponed to September 2021.

References

Abadie, A., & Imbens, G.W. (2006). Large sample properties of matching estimators for average treatment effects. *Econometrica*,74, 235–267.

Abadie, A., & Imbens, G.W. (2011). Bias-corrected matching estimators for average treatment effects. *Journal of Business and Economic Statistics*, 29, 1–11.

Abadie, A., & Imbens, G.W. (2012). Matching on the estimated propensity score. *Harvard University and National Bureau of Economic Research*.

Aliperti, G., Sandholz, S., Hagenlocher, M., Rizzi, F., Frey, M., & Garschagen, M. (2019). Tourism, crisis, disaster: An interdisciplinary approach. *Annals of Tourism Research*, 79, 102808.

Álvarez-Díaz, M., Chamorro-Rivas, J. M., González-Gómez, M., & Otero-Giráldez, M. S. (2023). The impact of the COVID-19 outbreak on intra- and inter-regional domestic travel: Evidence from Spain. *Tourism Economics*, 0(0).

Assaf, A., & Scuderi, R. (2020). COVID-19 and the recovery of the tourism industry. *Tourism Economics*, 26(5), 731–733.

Babin, B. J., Darden, W. R., & Griffin, M. (1994). Work and/or fun: Measuring hedonic and utilitarian shopping value. *Journal of Consumer Research*, 20(4), 644–656.

Barquet, A., Brida, J. G., Osti, L., & Schubert, S. (2011). An analysis of tourists' expenditure on winter sports events through the Tobit censorate model. *Tourism Economics*, 17(6), 1197-1217.

Borowski, J., & Jaworski, K. (2023). Economic and behavioral determinants of forced household savings during the COVID-19 pandemic. *Empirica*, 50(1), 237-253.

Boto-García, D., & Leoni, V. (2022). Exposure to COVID-19 and travel intentions: Evidence from Spain. *Tourism Economics*, 28(6), 1499–1519.

Bull, C. J. (2006). Racing cyclists as sports tourists: The experiences and behaviours of a case study group of cyclists in East Kent, England. *Journal of Sport Tourism*, 11(3-4), 259–274.

Campbell, J. Y., Giglio, S., & Pathak, P. (2011). Forced sales and house prices. *American Economic Review*, 101(5), 2108–2131.

Cannon, T. F., & Ford, J. (2002). Relationship of demographic and trip characteristics to visitor spending: an analysis of sports travel visitors across time. *Tourism Economics*, 8(3), 263–271.

Canton, E., Colasanti, F., Durán, J., Garrone, M., Hobza, A., Simons, W., & Vandeplas, A. (2021). The Sectoral Impact of the COVID-19 Crisis. An Unprecedented and Atypical Crisis. *European Economy - Economic Briefs, 069. Directorate General Economic and Financial Affairs (DG ECFIN), European Commission*.

Cho, H. (2023). Nostalgia in Sport and Leisure. *Current Opinion in Psychology*, 101551.

Cho, H., Oh, G. E., & Chiu, W. (2021). Compensatory consumption during the COVID-19 pandemic: exploring the critical role of nostalgia in sport consumer behaviour. *Journal of Marketing Management*, 37(17-18), 1736-1763.

Cho, H., Joo, D., Moore, D., & Norman, W. C. (2019). Sport tourists' nostalgia and its effect on attitude and intentions: A multilevel approach. *Tourism Management Perspectives*, 32, 100563.

Crang, P. (1996). Displacement, consumption, and identity. *Environment and Planning A*, 28(1), 47–67.

Deng, Y., Wu, Y., & Xu, H. (2021). On the relationship between pollution reduction and export product quality: Evidence from Chinese firms. *Journal of Environmental Management*, 281, 111883.

Daniels, M. J., & Norman, W. C. (2003). Estimating the economic impacts of seven regular sport tourism events. *Journal of Sport & Tourism*, 8(4), 214-222.

Deschamps, P., & De Sousa, J. (2021). Labor mobility and racial discrimination. *European Economic Review*, 135, 103738.

Desbordes, M. (2007). A review of the economic impact studies done on the Tour de France: Methodological aspects and first results, *Int. J. Sport Management and Marketing*, Vol. 2, Nos. 5/6, pp.526–540.

Desbordes, P., Lumsdon, L., & Weston, R. (2009). Visitor expenditure: The case of cycle recreation and tourism. *Journal of Sport & Tourism*, 14(1), 25-42.

Dey-Chowdhury, S., Khaliq, M., Okoye, G., & Abrahams, L. (2022). Effects of the coronavirus (COVID-19) pandemic on "high-contact" industries. *Office of National Statistics*. Retrieved from https://www.ons.gov.uk/economy/grossvalueaddedgva/articles/effectsofthecoronaviruscovid19pandemiconhighcontactindustries/2022-05-06.

Deyá-Tortella, B., Leoni, V., & Ramos, V. (2022). COVID-led consumption displacement: A longitudinal analysis of hotel booking patterns. *International Journal of Hospitality Management*, 107, 103343.

Downward, P., Lumsdon, L., & Weston, R. (2009). Visitor expenditure: The case of cycle recreation and tourism. *Journal of Sport & Tourism*, 14(1), 25-42.

Drakakis, P., Papadaskalopoulos, A., & Lagos, D. (2021). Multipliers and impacts of active sport tourism in the Greek region of Messinia. *Tourism Economics*, 27(3), 527–547.

Fernández, B. M. C., González, R. C. L., & Lopez, L. (2016). Historic city, tourism performance and development: The balance of social behaviours in the city of Santiago de Compostela (Spain). *Tourism and Hospitality Research*, 16(3), 282–293.

Fourie, J., & Santana-Gallego, M. (2011). The impact of mega-sport events on tourist arrivals. *Tourism Management*, 32(6), 1364–1370.

Frawley, S., and Schulenkorf, N. (2022). *Routledge Handbook of Sport and COVID-19*. London, UK: Routledge Handbooks.

Gârdan, D. A., Gârdan, I. P., Andronie, M., & Dumitru, I. (2020). Sport Events Customers' Behavior in the Light of Hedonic Consumption. *International Journal of Marketing Studies*, 12(3), 26-40.

Getz, D. & Page, S. J. (2020) *Event Studies: Theory, Research and Policy for Planned Events*. 4th edition. Abingdon: Routledge.

Getz, D. (1997). Trends and issues in sport event tourism. *Tourism Recreation Research*, 22(2), 61-62.

Getz, D. (2003). Sport event tourism: Planning, development, and marketing. In S. Hudson (Ed.), *Sport and adventure tourism* (pp. 49-88). New York: Haworth.

Getz, D. (2008). Event tourism: Definition, evolution, and research. *Tourism Management*, 29(3), 403-428.

Getz, D. (2021). *Dictionary of Event Studies, Event Management and Event Tourism*. Oxford, UK: Goodfellow Publishers.

Getz, D., & McConnell, A. (2014). Comparing Trail Runners and Mountain Bikers: Motivation, Involvement, Portfolios, and Event-Tourist Careers. *Journal of Convention & Event Tourism*, 15(1), 69–100.

Getz, D., & Page, S. J. (2016). Progress and prospects for event tourism research. *Tourism Management*, 52, 593-631.

Gibson, H., McIntyre, S., MacKay, S., & Riddington, G. (2005). The economic impact of sports, sporting events, and sports tourism in the UK The DREAM™ Model. *European Sport Management Quarterly*, 5(3), 321–332.

Gössling, S., & Schweiggart, N. (2022). Two years of COVID-19 and tourism: what we learned, and what we should have learned. *Journal of Sustainable Tourism*, 30(4), 915-931.

Gössling, S., Scott, D., & Hall, C. M. (2021). Pandemics, tourism and global change: A rapid assessment of COVID-19. *Journal of Sustainable Tourism*, 29(1), 1–20.

Gupta, A. S., & Mukherjee, J. (2022). Long-term changes in consumers' shopping behavior post-pandemic: an exploratory study. *International Journal of Retail & Distribution Management*, 50(12), 1518-1534.

Jones, T., & Nguyen, M. H. (2021). COVID-19 early stage social acceptance of entry restrictions for international tourists to Japan. *Journal of Tourism Futures*, 7(3), 322-336.

Henderson, J. C., & Ng, A. (2004). Responding to crisis: Severe acute respiratory syndrome (SARS) and hotels in Singapore. *International Journal of Tourism Research*, 6(6), 411-419.

Hinch, T. D., & Higham, J. E. (2001). Sport tourism: A framework for research. *International Journal of Tourism Research*, 3(1), 45–58.

Kennelly, M. (2022). COVID-19 and sport tourism. In *Routledge Handbook of Sport and COVID-19*. Frawley, S. and Schuenkorf, N. (Eds.). London, UK: Routledge Handbooks, pags. 161-172.

Keshkar, S., & Karegar, G. A. (2022). Effect of the COVID-19 pandemic on the sports industry. In *COVID-19 and the Sustainable Development Goals* (pp. 123-157). Editor(s): Mohammad Hadi Dehghani, Rama Rao Karri, Sharmili Roy. Elsevier.

Kim, E. E. K., Seo, K., & Choi, Y. (2022). Compensatory Travel Post COVID-19: Cognitive and Emotional Effects of Risk Perception. *Journal of Travel Research*, 61(8), 1895–1909.

Koenig-Lewis, N., Asaad, Y., & Palmer, A. (2018). Sports events and interaction among spectators: Examining antecedents of spectators' value creation. *European Sport Management Quarterly*, 18(2), 193-215.

Kwiatkowski, G., León-Guereño, P., Malchrowicz-Mośko, E., & Castaneda Babarro, A. (2022). Chapter 3: The impact of COVID-19 on amateur sport. In *Research Handbook on Sport and COVID-19*. Cheltenham, UK: Edward Elgar Publishing.

Lee, C. C., & Chen, M. P. (2022). The impact of COVID-19 on the travel and leisure industry returns: Some international evidence. *Tourism Economics*, 28(2), 451-472.

Li, J., Nguyen, T. H. H., & Coca-Stefaniak, J. A. (2020). Coronavirus impacts on post-pandemic planned travel behaviours. *Annals of Tourism Research*, 86, 102964.

Lins, S., Aquino, S., Costa, A. R., & Koch, R. (2022). From panic to revenge: Compensatory buying behaviors during the pandemic. *International Journal of Social Psychiatry*, 68(4), 921-922.

Liu, Y., Cai, L., Ma, F., & Wang, X. (2023). Revenge buying after the lockdown: Based on the SOR framework and TPB model. *Journal of Retailing and Consumer Services*, 72, 103263.

Lock, D., and Reghunathan, A. (2022). COVID-19 and sports consumption. In *Routledge Handbook of Sport and COVID-19*. Frawley, S. and Schuenkorf, N. (Eds.). London, UK: Routledge Handbooks, pags. 131-140.

Maditinos, Z., Chris Vassiliadis, Yannis Tzavlopoulos & Serafeim A.Vassiliadis (2021). Sports events and the COVID-19 pandemic: assessing runners' intentions for future participation in running events – evidence from Greece, *Tourism Recreation Research*, 46:2,276-287.

Malhotra, S. (2021). Empirical scale for revenge buying behaviour: A curious consequence of pandemic. *BIMTECH Business Perspective (BSP)*, 3(1), 1–14.

Michael, N., & Fusté-Forné, F. (2022). Marketing of luxurious gastronomic experiences on social media: The visual storytelling of luxury hotels. *International Journal of Tourism Research*, 24(6), 827-838.

Mosconi, G., Roi, G. S., Totti, V., Zancanaro, M., Tacconi, A., Todeschini, P., ... Nanni Costa, A. (2015). Renal Function in Kidney and Liver Transplant Recipients After A 130-km Road Cycling Race. *Transplant Direct*, 1(9), e36.

Müller-Schell, W. (2012). *Classic Cycle Routes of Europe: The 25 Greatest Road Cycling Races and how to Ride Them*. A&C Black.

Nhamo, G., Dube, K., Chikodzi, D. (2020). Impact of COVID-19 on the Global Sporting Industry and Related Tourism. In: *Counting the Cost of COVID-19 on the Global Tourism Industry*, Eds. Nhamo, G.; Dube, K.; Chikodzi, D. pages 225-249. Springer: Cham, Switzerland.

Nicolau, J. L. (2021). Editorial of the special issue on "Sports and Tourism: Economic Impacts." *Tourism Economics*, 27(3), 415–418.

Nicolau, J. L., Sharma, A., & Zarankin, T. (2019). The effect of the 2018 Giro d'Italia on Israel's tourism firm value. *Tourism Economics*, 25(7), 1070–1083.

Nigg, S. (2011). Changing travel booking patterns in European travel agencies. In *Trends and Issues in Global Tourism* 2011 (pp. 19–25). Springer, Berlin, Heidelberg.

Nunn, N. & Qian, N. (2011). The impact of potatoes on old world population and urbanization. *The Quarterly Journal of Economics*, 126 (2), 593–650.

Park, I., Lee, J., Lee, D., Lee, C., & Chung, W. Y. (2022). Changes in consumption patterns during the COVID-19 pandemic: Analyzing the revenge spending motivations of different emotional groups. *Journal of Retailing and Consumer Services*, 65, 102874.

Pedersen, P. (2022). *Research Handbook on Sport and COVID-19*. Cheltenham, UK: Edward Elgar Publishing.

Pérez-Granja, U., Andina-Díaz, A., & Jiménez, J. L. (2024). Volcanic eruptions and tourism prosocial consumption. *Tourism Economics*, OnlineFirst.

Provenzano, D., & Volo, S. (2022). Tourism recovery amid COVID-19: The case of Lombardy, Italy. *Tourism Economics*, 28(1), 110–130.

Ramasamy, B., Wu, H., & Yeung, M. (2022). Hosting annual international sporting events and tourism: Formula 1, golf or tennis? *Tourism Economics*, 28(8), 2082–2098.

Rejón-Guardia, F., García-Sastre, M. A., & Alemany-Hormaeche, M. (2018). Motivation-based behaviour and latent class segmentation of cycling tourists: A study of the Balearic Islands. *Tourism Economics*, 24(2), 204–217.

Roi, G. S., & Tinti, R. (2014). Requests for medical assistance during an amateur road cycling race. *Accident Analysis & Prevention*, 73, 170-173.

Rosenbaum, P. R., & Rubin, D.B. (1983). The central role of the propensity score in observational studies for causal effects. *Biometrika*, 70, 41–55.

Rubin, D. B. (1973). Matching to remove bias in observational studies. *Biometrics*, 29, 159–183.

Rubin, D. B. (1977). Assignment to treatment group on the basis of a covariate. *Journal of Educational Statistics*, 2, 1–26.

Saayman, M., & Saayman, A. (2012). Determinants of spending: An evaluation of three major sporting events. *International Journal of Tourism Research*, 14(2), 124–138.

Salgado-Barandela, J., Barajas, Á., & Sánchez-Fernández, P. (2021). Sport-event portfolios: An analysis of their ability to attract revenue from tourism. *Tourism Economics*, 27(3), 436–454.

Scarpi, D., Pizzi, G., Visentin, M., 2014. Shopping for fun or shopping to buy: is it different online and offline? *Journal of Retailing and Consumer Services* 21 (3), 258–267.

Skinner, J., & Smith, A. C. (2021). Introduction: sport and COVID-19: impacts and challenges for the future (Volume 1). *European Sport Management Quarterly*, 21(3), 323-332.

Stetic, S., Simicevic, D., & Stanic, S. (2011). Same-day trips: A chance of urban destination development. *UTMS Journal of Economics*, 2(2), 113.

Su, X., Spierings, B., Hooimeijer, P., & Scheider, S. (2020). Where day trippers and tourists go: comparing the spatio-temporal distribution of Mainland Chinese visitors in Hong Kong using Weibo data. *Asia Pacific Journal of Tourism Research*, 25(5), 505–523.

Vayá, E., Garcia, J. R., Suriñach, J., & Pons, E. (2023). Effects of the COVID-19 tourism crisis on the Spanish economy. *Tourism Economics*, 0(0).

Vegara-Ferri, J. M., Pallarés, J. G., & Angosto, S. (2021). Differences in residents' social impact perception of a cycling event based on the fear of the COVID-19 pandemic. *European Sport Management Quarterly*, 21(3), 374-390.

Wagner, T., Rudolph, T., (2010). Towards a hierarchical theory of shopping motivation. *Journal of Retailing and Consumer Services* 17 (5), 415–429.

Wang, J., & Xia, L. (2021). Revenge travel: Nostalgia and desire for leisure travel post COVID-19. *Journal of Travel & Tourism Marketing*, 38(9), 935-955.

Weed, M. (2009). Progress in sports tourism research? A meta-review and exploration of futures. *Tourism Management*, 30(5), 615-628.

Weed, M. (2020). The role of the interface of sport and tourism in the response to the COVID-19 pandemic. *Journal of Sport & Tourism*, 24(2), 79-92.

Wicker, P., Hallmann, K., & Zhang, J. J. (2012). What is influencing consumer expenditure and intention to revisit? An investigation of marathon events. *Journal of Sport & Tourism*, 17(3), 165-182.

Yang, Y., Altschuler, B., Liang, Z., & Li, X. R. (2021). Monitoring the global COVID-19 impact on tourism: The COVID-19 tourism index. *Annals of Tourism Research*, 90, 103120.

Yang, Z., Fan, M., Shao, S., & Yang, L. (2017). Does carbon intensity constraint policy improve industrial green production performance in China? A quasi-DID analysis. *Energy Economics*, 68, 271-282.

Zhang, T., & Tang, M. (2021). The Impact of the COVID-19 pandemic on ambient air quality in China: A quasi-difference-in-difference approach. *International Journal of Environmental Research and Public Health*, 18(7), 3404.

Ziakas, V., Antchak, V., & Getz, D. (2021). Chapter 1 Theoretical Perspectives of Crisis Management and Recovery for Events. In V. Ziakas, V. Antchak, & D. Getz (Eds.), *Crisis Management and Recovery for Events: Impacts and Strategies*. Oxford, UK: Goodfellow Publishers.

Table 1. Characteristics of Nove Colli race editions. This table presents the technical details and number of participants for the three editions of the Nove Colli race analyzed in this paper.

	46th Edition May 22, 2016		50th Edition September 26, 2021		51st Edition May 22, 2022	
	Short route	Long route	Short route	Long Route	Short route	Long route
Length (km)	130	200	131	205	130	205
Total uphill gradient (m)	1,871	3,840	1,871	3,840	1,871	3,840
Uphill riding (km)	50	89	50	89	50	89
Downhill riding (km)	46	77	46	77	46	77
Flat terrain (km)	34	34	34	39	34	39
Max time allowed (h)	7.5	12.0	7.3	12.0	7.3	12.0
Number of participants	10,288		9,013		7,843	

Table 2. Description of variables, with mean and s.d. (whole sample; N=2,734). This table provides descriptions, means, and standard deviations ("s.d.") for variables related to respondents' expenditures and demographics. It includes various expenditure types (equivalent, total, accommodation, food and beverage, travel, and side expenses) and participant types (day-tripper, resident, and tourist). Additional demographics include gender, age, job type, nationality, and prior race participation.

Variables	Description	Mean	s.d.
Type of expenditures			
Equivalent Expenditure	Total expenditure per day per person	308.1	446.5
Total Expenditure	Total amount of expenses for travel, food, lodging, race registration, and side expenses, also considering the expenses incurred for accompanying individuals that fall under the same budget, and other expenses that were explicitly stated by a minority of respondents.[a]	1,041.6	1,606.1
Accommodation	Amount of money spent on accommodation per night per person (EUR).	66.1	50.7
Food and Beverage	Amount of money spent per person, per day on food and beverages including expenses incurred at bars, restaurants, for drinks and food, expressed (EUR)	50.3	44.0
Travel	Amount of money spent on traveling and moving around, including expenses such as petrol, public transport tickets, and any other transportation costs (in EUR).	115.6	97.2
Side Expenses	Sum of expenses in sports equipment and clothes, souvenirs, and merchandising.	307.3	1,404.7
Type of participant			
Day-Tripper	A participant who is not resident in the province of the race (Forlì Cesena) but does not stay overnight.	6.4%	0.245
Resident	Resident in the province of the race (Forlì Cesena)	4.7%	0.212
Tourist	A participant who stays overnight (at least one night).	88.9%	0.314
Other characteristics			
Female	Gender; 1 if female	6.1%	0.240
Age	Age	48.8	10.134
Job Type	Occupation. Possible answers included:		
	Private Employee	53.8%	0.499
	Public Employee	13.2%	0.339
	Self-employed	22.0%	0.414
	Unemployed	1.2%	0.108
	Retired	8.4%	0.278
	Student	0.7%	0.085
	Other	0.6%	0.079
Foreigner	1 if do not live in Italy[b]	6.1%	0.240
Nr Past Editions	Number of race editions in which the race participant has taken part	5.259	4.979

[a] Competition registration fees and other expenses were not analyzed separately since the former is uniform across all competitors and the latter counts only a few observations.

[b] See also Tables A5 and A6 for detailed statistics across the three race editions about respondents' country and region of origin, respectively.

Table 3. Average values and balance tests across periods. This table presents average values for all variables across different periods: pre-CoV19 (a), post-lockdown (b), and post-CoV19 (c). The final two columns show the results of t-tests for mean differences.

Variable	Pre-CoV19 (a)	Post-lockdown (b)	Post-CoV19 (c)	Δ (b-a)	Δ (c-a)
Type of expenditures					
Equivalent expenditure (log)	5.313	5.600	5.391	0.287***	0.078***
Total expenditure (log)	6.437	6.710	6.516	0.273***	0.080**
Accommodation per night per person (log)	3.647	3.716	3.624	0.069	-0.023
Food and beverage expenses (log)	3.315	3.854	3.395	0.539***	0.081
Travel expenses (log)	4.061	4.458	4.335	0.396***	0.273***
Side expenses (log)	3.637	4.974	3.982	1.337***	0.345***
Type of participant					
Day-tripper (dummy)	0.084	0.049	0.063	-0.036***	-0.021*
Resident (dummy)	0.034	0.054	0.051	0.020**	0.017*
Tourist (dummy)	0.881	0.897	0.886	0.016	0.005
Other characteristics					
Female (dummy)	0.062	0.067	0.053	0.005	-0.008
Male (dummy)	0.938	0.933	0.947	-0.005	0.008
Age (log)	3.841	3.887	3.857	0.046***	0.017
Private employee (dummy)	0.536	0.560	0.512	0.024	-0.024
Public employee (dummy)	0.063	0.149	0.181	0.086***	0.118***
Self-employee (dummy)	0.290	0.169	0.213	-0.121***	-0.078***
Unemployed (dummy)	0.006	0.016	0.012	0.010**	0.006
Retired (dummy)	0.081	0.094	0.076	0.013	-0.005
Student (dummy)	0.014	0.004	0.005	-0.010**	-0.010**
Other job position (dummy)	0.010	0.007	0.002	-0.003	-0.007*
Foreigner (dummy)	0.114	0.043	0.032	-0.071***	-0.082***
Nr Past Editions (log)	1.364	1.244	1.157	-0.120***	-0.206***
Observations	841	1,051	842	2,734	2,734

* p<0.05, ** p<0.01, *** p<0.001

Table 4. Average Treatment Effect (whole sample; N=2,734). This table presents several figures related to the post-lockdown vs. pre-CoV19 comparison (Panel A) and post-CoV19 vs. pre-CoV19 comparison (Panel B). In both panels, Column 1 reports the Average Treatment Effect (ATE); Column 2 displays pre-CoV19 spending levels, while Columns 3 and 4 represent post-lockdown (Panel A) or post-CoV19 (Panel B) spending levels without adjustments and the percentage changes from their respective pre-Cov19 levels, respectively. Column 5 reports post-lockdown (Panel A) or post-CoV19 (Panel B) spending levels with adjustments to align sample comparability and mitigate inflation effects. Column 6 displays the percentage changes of these adjusted expenses from their respective pre-CoV19 levels. Column 7 reports the bias arising when expenditure percentage variations do not include adjustments for inflation and sample comparability.

Panel A: Post-lockdown vs. Pre-CoV19

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
			Unadjusted values		Sample and inflation adjustments		
Variable	ATE	Pre-CoV19 expenditure (€)	Post-lockdown expenditure (€)	Δ (a) (%)	Post-lockdown expenditure (€)	Δ (b) (%)	Bias (a - b) (%)
Equivalent Expenditure	0.289***	188	275	46.7	242	28.9	17.8
	[0.028]						
Total Expenditure	0.318***	575	850	47.8	758	31.8	16.0
	[0.034]						
Accommodation expenses	0.005	60	65	8.3	60	0.5	7.8
	[0.025]						
Food and beverage expenses	0.537***	23	50	117.4	35	53.7	63.7
	[0.040]						
Travel expenses	0.384***	90	100	11.1	125	38.4	-27.3
	[0.054]						
Side expenses	1.338***	60	200	233.3	140	133.8	99.5
	[0.091]						

Panel B: Post-CoV19 vs. Pre-CoV19

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
			Unadjusted values		Sample and inflation adjustments		
Variable	ATE	Pre-CoV19 expenditure (€)	Post-CoV19 expenditure (€)	Δ (a) (%)	Post-CoV19 expenditure (€)	Δ (b) (%)	Bias (a - b) (%)
Equivalent Expenditure	0.076**	188	236.67	26.2	202	7.6	18.6
	[0.030]						
Total Expenditure	0.137***	575	762.5	32.6	654	13.7	18.9
	[0.037]						
Accommodation expenses	-0.029	60	66.67	11.1	58	-2.9	14.0
	[0.025]						
Food and beverage expenses	0.083*	23	40	73.9	25	8.3	65.6
	[0.049]						
Travel expenses	0.299***	90	100	11.1	117	29.9	-18.8
	[0.060]						
Side expenses	0.303***	60	120	100.0	78	30.3	69.7
	[0.109]						

Robust standard errors in brackets. * p<0.05, ** p<0.01, *** p<0.001

Table 5. Revenge spending (whole sample and subsamples by participant type). This table presents the impact of increased spending, known as "revenge spending," across various expenditure categories for the whole sample (N=2,734) and specific participant subgroups—Tourists (N=2,430), Residents (N=129), Day-Trippers (N=175). For each variable, the figures are derived by comparing the Average Treatment Effects on the Treated (ATE^Ts) and Average Treatment Effects on the Controls (ATE^Cs). For the whole sample, these figures are derived from Table 4; for the participant subgroups, figures are derived from Tables A1, A2, and A3 in the Appendix.

Variable	Whole sample (%)	Tourists (%)	Residents (%)	Day-trippers (%)
Equivalent Expenditure	21.3***	19.2***	35.8***	41.1
Total Expenditure	18.1***	14.7***	46.3***	42.3
Accommodation expenses	3.4	-2.5		
Food and beverage expenses	45.4***	34.9***	142.9***	126.1**
Travel expenses	8.5	0.3	167.5	6.8
Side expenses	103.5***	100***	74.4***	154.5*

* p<0.05, ** p<0.01, *** p<0.001

Appendix A. Additional Tables

Table A1. Average Treatment Effect (Tourists subsample; N=2,430)

Panel A: Post-lockdown vs. Pre-CoV19

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
			Unadjusted values		Sample and inflation adjustments		
Variable	ATE	Pre-CoV19 expenditure (€)	Post-lockdown expenditure (€)	Δ (a) (%)	Post-lockdown expenditure (€)	Δ (b) (%)	Bias (a - b) (%)
Equivalent Expenditure	0.262*** [0.027]	189	270	42.6	239	26.2	16.4
Total Expenditure	0.292*** [0.035]	621	896	44.3	802	29.2	15.1
Accommodation expenses	0.008 [0.029]	60	66.67	11.1	60	0.8	10.3
Food and beverage expenses	0.560*** [0.038]	40	50	25.0	62	56.0	-31.0
Travel expenses	0.292*** [0.053]	100	100	0.0	129	29.2	-29.2
Side expenses	1.349*** [0.093]	60	210	250.0	141	134.9	115.1

Panel B: Post-CoV19 vs. Pre-CoV19

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
			Unadjusted values		Sample and inflation adjustments		
Variable	ATE	Pre-CoV19 expenditure (€)	Post-CoV19 expenditure (€)	Δ (a) (%)	Post-CoV19 expenditure (€)	Δ (b) (%)	Bias (a - b) (%)
Equivalent Expenditure	0.070** [0.029]	189	237.04	25.2	203	7.0	18.2
Total Expenditure	0.145*** [0.038]	621	807.5	30.0	711	14.5	15.5
Accommodation expenses	-0.033 [0.028]	60	70	16.7	62	3.3	13.4
Food and beverage expenses	0.211*** [0.045]	40	48.75	21.9	48	21.1	0.8
Travel expenses	0.289*** [0.062]	100	120	20.0	129	28.9	-8.9
Side expenses	0.349*** [0.114]	60	120	100.0	81	34.9	65.1

Robust standard errors in brackets.* p<0.05, ** p<0.01, *** p<0.001

Table A2. Average Treatment Effect (Residents subsample; N=129)

Panel A: Post-lockdown vs. Pre-CoV19

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
			Unadjusted values		Sample and inflation adjustments		
Variable	ATE	Pre-CoV19 expenditure (€)	Post-lockdown expenditure (€)	Δ (a) (%)	Post-lockdown expenditure (€)	Δ (b) (%)	Bias (a - b) (%)
Equivalent Expenditure	0.740*** [0.165]	137	335	144.5	238	74.0	70.5
Total Expenditure	0.926*** [0.136]	140	400	185.7	270	92.6	93.1
Food and beverage expenses	0.886*** [0.259]	7	50	614.3	13	88.6	525.7
Travel expenses	1.559*** [0.322]	10	50	400.0	26	155.9	244.1
Side expenses	1.828*** [0.498]	50	170	240.0	141	182.8	57.2

Panel B: Post-CoV19 vs. Pre-CoV19

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
			Unadjusted values		Sample and inflation adjustments		
Variable	ATE	Pre-CoV19 expenditure (€)	Post-CoV19 expenditure (€)	Δ (a) (%)	Post-CoV19 expenditure (€)	Δ (b) (%)	Bias (a - b) (%)
Equivalent Expenditure	0.382** [0.164]	137	195	42.3	189	38.2	4.1
Total Expenditure	0.463*** [0.157]	140	260	85.7	205	46.3	39.4
Food and beverage expenses	-0.543* [0.305]	7	10	42.9	3	-54.3	97.2
Travel expenses	-0.116 [0.319]	10	10	0.0	9	-11.6	11.6
Side expenses	1.084* [0.562]	50	110	120.0	104	108.4	11.6

Robust standard errors in brackets. * p<0.05, ** p<0.01, *** p<0.001

Table A3. Average Treatment Effect (Day-trippers subsample; N=175)

Panel A: Post-lockdown vs. Pre-CoV19

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
			Unadjusted values		Sample and inflation adjustments		
Variable	ATE	Pre-CoV19 expenditure (€)	Post-lockdown expenditure (€)	Δ (a) (%)	Post-lockdown expenditure (€)	Δ (b) (%)	Bias (a - b) (%)
Equivalent Expenditure	0.335**	193	346.67	80.1	257	33.5	46.6
	[0.143]						
Total Expenditure	0.284*	298	470	57.7	383	28.4	29.3
	[0.149]						
Food and beverage expenses	-0.027	23	50	117.4	24	2.7	114.7
	[0.288]						
Travel expenses	0.458	25	76.26	205.0	36	45.8	159.2
	[0.326]						
Side expenses	0.943**	60	250	316.7	117	94.3	222.4
	[0.414]						

Panel B: Post-CoV19 vs. Pre-CoV19

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
			Unadjusted values		Sample and inflation adjustments		
Variable	ATE	Pre-CoV19 expenditure (€)	Post-CoV19 expenditure (€)	Δ (a) (%)	Post-CoV19 expenditure (€)	Δ (b) (%)	Bias (a - b) (%)
Equivalent Expenditure	-0.076	193	255	32.5	178	-7.6	40.1
	[0.148]						
Total Expenditure	-0.139	298	290	-2.7	257	-13.9	11.2
	[0.143]						
Food and beverage expenses	-1.234***	23	10	-56.5	-5	-123.4	66.9
	[0.288]						
Travel expenses	0.390	25	40	60.0	35	39.0	21.0
	[0.266]						
Side expenses	-0.602	60	90	50.0	24	-60.2	110.2
	[0.454]						

Robust standard errors in brackets. * p<0.05, ** p<0.01, *** p<0.001

Table A4. Average Treatment Effects on the treated (ATE^T) and untreated (ATE^C)

	Regression Adjustments	Nearest-Neighbor Matching	Propensity-Score Matching
ATE^T			
Equivalent Expenditure	0.289***	0.280***	0.256***
	[0.028]	[0.030]	[0.033]
Total Expenditure	0.318***	0.332***	0.313
	[0.034]	[0.038]	[0.421]
ATE^C			
Equivalent Expenditure	0.076**	0.064**	0.103***
	[0.030]	[0.032]	[0.034]
Total Expenditure	0.137***	0.122***	0.154***
	[0.037]	[0.043]	[0.047]

Robust standard errors in brackets. * p<0.05, ** p<0.01, *** p<0.001

Table A5. Countries of origin of respondents across race editions (percentages)

Country of origin	Pre-CoV19	Post-lockdown	Post-CoV19	Total
Austria	0.95	0.48	0.36	0.59
Belgium	1.78	0.38	0.12	0.73
Brazil	0	0	0.12	0.04
France	0.12	0	0.12	0.07
Germany	3.69	1.33	0.48	1.79
Irland	0.24	0.1	0	0.11
Italy	88.59	95.72	96.79	93.86
Morocco	0	0	0.12	0.04
Netherlands	0.24	0.19	0.12	0.18
San Marino	0.24	0.48	0.12	0.29
South Africa	0.12	0	0	0.04
Sweden	0.48	0	0.48	0.29
Switzerland	2.85	0.86	0.95	1.5
UK	0.59	0.38	0.24	0.4
USA	0.12	0.1	0	0.07

Table A6. Regions of origin of Italian respondents across race editions (percentages)

Region of origin	Pre-CoV19	Post-lockdown	Post-CoV19	Total
Abruzzo	3.92	1.62	1.43	2.27
Basilicata	0.83	0.29	0.12	0.4
Calabria	1.55	2.09	1.19	1.65
Campania	7.97	6.95	7.48	7.43
Emilia-Romagna	14.15	18.46	17.81	16.93
Friuli-Venezia Giulia	0.95	2.09	2.02	1.72
Lazio	9.63	8.37	12.23	9.95
Liguria	1.55	1.62	1.66	1.61
Lombardia	17.36	20.65	17.34	18.62
Marche	2.02	2.38	2.73	2.38
Molise	0.12	0.38	0.12	0.22
Piemonte	4.52	8.18	7.96	6.99
Puglia	4.28	3.9	6.77	4.9
Sardegna	0.12	0.19	0	0.11
Sicilia	0.12	1.14	1.54	0.95
Toscana	7.13	7.04	5.94	6.73
Trentino-Alto Adige	2.5	2.19	2.73	2.45
Umbria	1.9	2.95	2.38	2.45
Valle d'Aosta	0.83	0.76	0.71	0.77
Veneto	7.13	4.47	4.63	5.34
Total Italy	88.59	95.72	96.79	93.86
Foreign	11.41	4.28	3.21	6.14