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SPORT-RELATED PHYSICAL ACTIVITY IN TOURISM: AN ANALYSIS OF ANTECEDENTS OF SPORT BASED APPLICATIONS USE

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Abstract
Wearable devices and mobile applications (hereafter referred to as apps) used in sport and physical activity have widely changed the way sport is practised. However, experts still understand little about the antecedents of tourists' sport apps use. Drawing on the theory of reasoned action, this study examined attitudinal and norm-based factors that influence users' continuance intention towards sport apps as predictors of use in trips. A questionnaire was designed based on the existing literature in order to collect the relevant data from centres and places for doing sport. The final sample consisted of 362 sport practitioners and users of sport apps, whose responses were used to test the model. The results indicate that all attitudinal factors (i.e. performance expectancy, effort expectancy, perceived satisfaction, perceived enjoyment and perceived gamification) and norm-based factors (i.e. social influences) affect users' continuance intention towards Smart Internet of Things sport apps. In addition, the respondents' continuance intention towards these apps affects their sport apps use in trips. Theoretical and managerial implications for the tourism industry are discussed.

Keywords: Use in Trips, Theory of Reasoned Action, Sport App, partial least squares (PLS)

1. Introduction

Currently, experts strongly recommend that destinations seeking to gain competitive advantages over competitors should diversify their offer to avoid a reliance on just sun-and-beach tourism (Exceltur, 2019). In parallel, the institutional support for – and even in some cases pressure to move towards – smart destination development has been highlighted in the recent literature on tourism (Gretzel et al. 2015). As a result, public tourism organisations and governmental entities have been working on formulating politics and strategies to increase the supply of innovative products and services. For example, Spain started different programmes promoting new tourism products and innovations in 2016 (i.e. the Spanish Government's Emprendetur) and 2019 (i.e. the Andalusian Regional Government's Pymetur).

Thus, tourism companies are currently deeply interested in developing innovations to improve their performance outcomes (Verreynne et al. 2019). In this context, some of the most interesting proposals have been in the area of sport not only when this is travellers' main motivation but also when sport is considered one more activity in destinations. People's tendency to remain sedentary during their leisure time has decreased in recent years, with more vigorous activities becoming increasingly habitual for a larger segment of men and woman (Román-Viñas et al. 2007). Naturally, these new life habits are continued during vacations and breaks from work.

In addition, the tourism industry in general, as well as specific destinations, has recently been working on new technology-based products. More specifically, the digitalisation of information about routes with natural, historical and/or other special value (e.g. cultural, gastronomy and sport) is highly recommended as a means by which to connect better with potential customers (Khovanova-Rubicondo 2012). This newly digitalised information allows tourists to interact and communicate individually with destinations in different ways (Minghetti and Buhalis 2010). For example, biking or running along significant tourism routes can be organised independently, allowing tourists to continue doing their aerobic exercise and complete their sport training in the same way as they would in their own neighbourhood.

In the next few years, the use of new technologies (i.e. Internet of Things [IoT] and virtual and augmented reality) is expected to expand, while fifth generation (5G) technology is being adopted more widely (Li et al. 2018). The more available the technology is, the more IoT-based applications (hereafter referred to as apps) can be used in daily life and, consequently, in tourism and sport activities. Sport apps also guide users through their own sport-related physical activities. More specifically, in the entertainment industry, 5G technology is used to provide immersive entertainment and online gaming apps (Lema et al. 2017). In tourism, new technologies can help reinforce users' relationships with the surrounding physical environment because they are motivated to practice sport in particular tourism destinations and public areas or along routes. These users can then compare and share their results with others and receive digital content and information about other individuals' results.

As sport apps have become more useful and inexpensive, the market demand for these apps has grown to include a large number of consumers (Kearney 2011). Regarding sport app use, previous studies have established that connections exist between sport app use and users' wellbeing (Macias et al. 2015). However, tourism research still needs more digital wellbeing

studies (Stankov and Filimonau 2019). More specifically, research should be conducted on app use in trips, including sport-based apps.

The present study sought, therefore, to explore the causal factors of sport app use in trips within a community of sport practitioners. To understand more thoroughly the causal relationships between inducements to do sport and actual sport app use in trips, the theory of reasoned action (TRA) was applied in this research. The TRA has been extensively used to explain the use of technologies and is associated with a broad theoretical framework utilised in consumer-based studies (Venkatesh et al. 2003). Fashbein and Ajzen (1975) conceptualised the TRA as a set of behavioural and normative intentions (i.e. attitude towards behaviour [ATB] and subjective norms) that are the immediate antecedents of behaviours. ATB is defined as 'an individual's positive or negative feelings (i.e. evaluative affect) about performing the target behavior' (Fishbein and Ajzen 1975, p. 216). In addition, the concept of subjective norms is explained as a 'person's perception that most people who are important to him think he should or should not perform the behavior in question' (Fishbein and Ajzen 1975, p. 302).

The current study conducted a survey of sport practitioners who use sport apps in different places to enhance their sport activities in Spanish province of Malaga. The main goal was to contribute to a better understanding of sport tourists and the factors affecting their continuance intention to use sport app. This paper is organised as follows. The next section provides the theoretical background, the model's conceptual foundations and the hypotheses development process. The third section discusses how partial least squares (PLS) was used to develop the model and test the hypotheses. The final sections cover the results and conclusions.

2. Literature review

2.1 Tourism and sport apps

Sport apps have been repeatedly studied in recent years by scholars who have emphasised the aspects of engagement in fitness (Asimakopoulus et al. 2017) and motivations (Kerner and Goodyear 2017). According to Wei (2014), within the fitness and sport sector, applications of sport apps and wearables range from sport performance to fitness monitoring, virtual coaching, outdoor tracking and body cooling. The functions associated with apps also vary

and include performance monitoring, activity tracking and goal monitoring, as well as direction data, location share and optimum performance.

In the literature on sport, sport app use has been related to health and healthy life styles (Depper and Howe 2017; Peever et al. 2017; Dallinga et al. 2018). According to McCallum, Rooksby and Gray's (2018) interdisciplinary review of physical activity apps and wearables, research on sport apps has most often assessed acceptability (57.7%). These studies have primarily used questionnaires (64%) or qualitative methods (53%) to explore intentions to continue sport app use, among other constructs.

Liang, Schuckert, Law and Masiero (2017) also conducted a literature review that covered 92 articles related to online reviews of tourism and hospitality businesses, which were published between 2002 and 2015 in academic journals. Of these publications, two studies of mobile technologies are of particular interest because of their focus on sport tourism. The first was conducted by Lamon and McKay (2012), who suggest that sport tourism research can benefit from the sociological perspective of postmodernism. The second study was done by Lin et al. (2014), who introduced an app for use in tourism promotion in the form of an energy expenditure monitor.

Overall, the literature on mobile app applications in tourism is expanding quickly (Lau et al. 2018). In the related publications, sport apps have been classified as global positioning system (GPS) based or social-based apps depending on their functions (Kennedy-Eden and Gretzel, 2012). However, studies of sport app use in tourism are still uncommon. In regard to related work, Lau, Cheng and Wang (2018) examined a set of 92 articles in 24 different hospitality and tourism journals, which were published from 2002 to 2017. The most frequently mentioned topics from the consumer's perspective were tourists' motivators and/or inhibitors to use and/or re-use mobile technologies for travel purposes. Two other common topics are the impacts of mobile technologies on consumers' travel patterns and behaviours, perceptions and preferences and these individuals' mobile technology use behaviours during trips.

Thus, the tourism industry needs information on the growing number of sport wearables and devices, especially given the absence of specific studies on motivators to use wearables and mobile apps to enhance sport-related physical activities. Tourists' use of sport apps has yet to be understood fully by researchers.

2.2 Theory of reasoned action (TRA)

The TRA (Fishbein and Ajzen 1975) explains specific behaviours through individual motivational elements and distinguishes between two types of cognitive factors: attitudinal behaviours and subjective normative factors. The TRA further specifies a limited number of psychological variables that can influence individuals' overall behaviour (Albarracín et al. 2001), including attitudinal behaviours and norm-based factors.

Regarding technology use, the literature on tourism reflects the importance of both previous use experiences and attitudes and patterns developed in the post-adoption phase (Benbasat and Barki 2007; Lamsfus et al. 2015). In addition, Montano and Kasprzyk (2015) argue that the most important factor explaining behaviours from a TRA perspective is the intention to engage in the relevant behaviours. Behavioural intention is a determinant of behaviour that is influenced by attitudinal behaviours (i.e. behavioural beliefs and evaluations of behavioural outcomes) and subjective norms (i.e. normative beliefs and motivation to comply). Attitude, in turn, is the degree to which an individual has evaluated or has a belief (i.e. positive or negative) about the behaviour in question and his or her reaction is weighted by evaluations of related attributes. Subjective norms are further weighted by the motivation to comply with important referent individuals. Consequently, individuals' behaviour is influenced by what important others think that they should or should not do.

The literature offers a profuse number of models of antecedents of consumers' use and intentions to use based on the TRA (Jeon et al. 2019). Regarding the constructs used when studying technology adoption, user acceptance of technology models show some similarities, including quite a few analogous constructs in research on determinants of intention to use or actual usage (Venkatesh et al. 2003).

2.3 Hypotheses development

This research's conceptual model was based on existing models of consumers' use and intentions to use technology identified in a literature review. The review's findings were used to formulate arguments about the relationship between the selected variables and to establish the research hypotheses. The behavioural beliefs and outcomes of performance expectancy (PE), effort expectancy (EE), perceived satisfaction (PS), perceived enjoyment (PEN) and perceived gamification (PG) were included in the model to explain attitudinal behaviours.

Previous studies have related PE to use intention or actual use (Oh et al. 2009; Venkatesh et al. 2012; Hazen et al. 2014). While research results have shown a stronger effect of PE on use (Oh et al. 2009), EE and use intention or actual use have also been linked by prior studies (Oh et al. 2009; Venkatesh et al. 2012). In addition, technology acceptance models based on the unified theory of acceptance and use of technology (UTAUT) have frequently used both PE and EE (Venkatesh et al. 2003; Venkatesh and Zhang 2010; Venkatesh et al. 2012; Kourouthanassis et al. 2015).

The results of research using models with PE and EE have been successfully applied to predict use intention or actual use, thereby verifying these factors' importance. Thus, in line with the existing literature, the present study predicted a positive relationship between PE and EE and continuance intention through ATB:

H1: For sport practitioners who use sport apps, PE is a predictor of ATB.

H2: For sport practitioners who use sport apps, EE is a predictor of ATB.

Academics have previously asserted that PS is a significant attitude (DeLone and McLean, 1992). Satisfaction has been related to attitude in the literature (Rüsch et al. 2014), and prior research's results for this relationship have confirmed direct effects between both constructs. More specifically, Rüsch et al. (2014) ran two regressions – a first model with direct effects only and a second model with direct and indirect effects – in which all direct effects (i.e. satisfaction with attitude included) remained significant.

The current study, therefore, included examining the relationship between PS and attitude as a predictor of continuance intention to use sport apps. Hence, the following hypothesis was proposed:

H3: For sport practitioners who use sport apps, PS is a predictor of ATB.

Davis, Bagozzi and Warshaw (1992) define enjoyment as the extent to which computer use is perceived to be personally enjoyable in its own right regardless of the technology's instrumental value. PEN is related to use in the existing literature, including directly (Shin 2009) and indirectly (Rese et al. 2017). Shin's (2009; 2011) results show that PEN, for hedonic purposes, is connected to both use and attitude. In addition, Rese et al. (2017) confirmed positive effects between PEN and attitude towards perceived usefulness. Based on these findings, the present study proposed the following hypothesis:

H4: For sport practitioners who use sport apps, PEN is a predictor of ATB.

According to Yang, Assad and Dwivedi's (2017) results, gamification generates more favourable attitudes towards the gamified brand (Yang et al. 2017). Tu, Hsieh and Feng further found that gamification was positively related to physical activities. However, Tu, Hsieh and Feng's (2018) study found that attitude should not be included as a determinant of physical activities. The current research sought to extend Tu, Hsieh and Feng's (2018) work by exploring the role of gamification in determining users' attitude. Taking into account these studies, a positive relationship was posited between gamification and sport practitioners' attitude for the present research:

H5: For sport practitioners who use sport apps, PG is a predictor of ATB.

In models based on theories of acceptance, attitude is a common determinant of continuance intention (Venkatesh et al. 2003). A variety of studies have thus postulated that attitudinal constructs are positively related to continuance intention (i.e. Kang 2014; Hsiao et al. 2016; Weng et al. 2017). Regarding apps use, scholars have examined different apps such as sport apps (Yuan et al. 2015), social apps (Hsaio et al. 2016) and taxi booking apps (Weng et al. 2017). These studies have applied different attitudinal constructs to explain how continuance intention towards apps can function as a determinant of attitude. For instance, these constructs have included PE (Kang 2014; Yuan et al. 2015), EE (Kang 2014) and satisfaction (Hsu and Lin 2015).

The existing literature provides support for a significant relationship between users' attitude and continuance intention towards sport apps. However, no studies focused on this research topic have proposed PE, EE, PS, PEN and PG as determinants of attitude. The current study's definition of determinants of attitudes towards continuance intention regarding sport apps, therefore, offers new insights into ways that technology acceptance models can be applied to users' continuance intention and actual use of these apps. Taking the previous literature into account, the following hypothesis was formulated:

H6: For sport practitioners who use sport apps, ATB is a predictor of continuance intention.

Subjective norms (SN) have long been investigated as predictors of users' continuance intention in terms of various behaviours. For example, researchers in this area have examined usage of dietary supplements (Dunn et al. 2001), websites (Kim et al. 2009), technology (Marcinkiewicz and Regstad 1996), analgesics (Pellino 1997) and learning systems (Binyamin et al. 2018). Social influence, which is represented as a subjective norm in the

TRA, is considered a direct determinant of behavioural intention (Venkatesh et al. 2003).

In addition, social norms have previously been used to study technology adoption (Luet al. 2015). These norms have been positively related to users' continuance intention regarding different phenomena, such as e-learning (Lee 2010), Web 2.0 (Chen et al. 2012) and social networks (Mouakket 2015). Furthermore, social norms and technology use have been confirmed as having a positive relationship (Kleijnenet al. 2004; Glegg et al. 2013). According to Lu, Mao, Wang and Hu (2015), collective values can determine individuals' need to identify with others and conform to these others' expectations regarding the use of travel apps. Based on these previous studies, the following hypothesis was formulated for the present research:

H7: For sport practitioners who use sport apps, subjective norms are a predictor of continuance intention.

Theories of acceptance assume that the intention to engage in a behaviour is a predictor of that behaviour (Venkatesh et al. 2003; Montano and Kasprzyk 2015). Bhattacherjee (2001) also argues that continuance intention plays a determinant role in business, and Song, Kim and Cho (2018) assert that continuance intention potentially generates sustainable market growth and products and/or services' long-term viability. The latter is considered a determinant of outcomes in consumer research. Finally, Venkatesh, Thong and Xu (2012) previously established a positive relationship between continuance intention and actual use regarding information technology. Therefore, in line with the existing literature, the present research model predicted a positive relationship between users' continuance intention towards sport apps and their use of sport apps in trips:

H8: For sport practitioners who use sport apps, continuance intention is a predictor of use in trips.

3. Research methodology

Using the TRA as the theoretical framework, this study sought to identify the significant determinants of continuance intention and actual use of sport apps in trips. This theoretical foundation and the hypotheses developed resulted in the research model shown in Figure 1.

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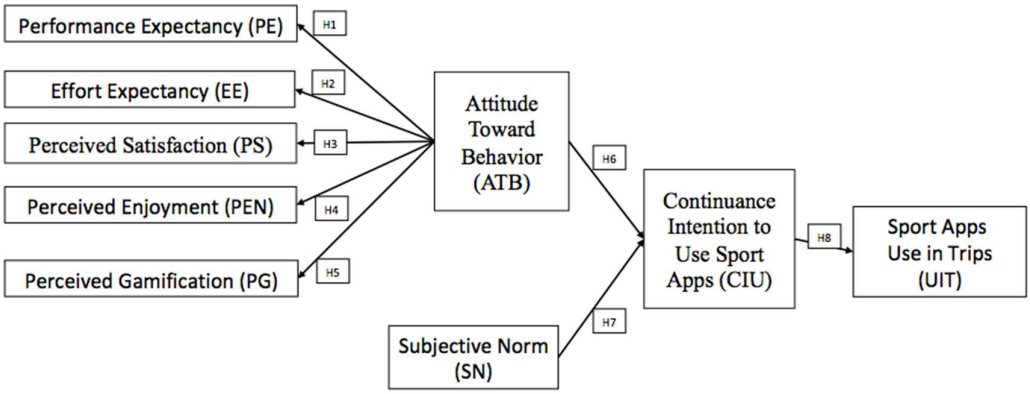

Figure 1: Research model

3.1 Sample and data collection

The data were collected from 9 different types of sport locations around the Spanish city of Malaga: the city centre, the promenade, the 2 city athletics stadiums, the city basketball pavilion, the city swimming pool pavilion, the university sports centres, 3 gyms, 2 sport clubs and 1 sport category killer. Malaga is the fifth largest Spanish city in terms of number of residents, with a population of 571,000 persons in 2018 (Instituto Nacional de Estadistica 2019). According to a study of sport habits in Andalusia (Junta de Andalucía 2017), Malaga has a higher percentage of residents who do sport than the regional average. Because of these statistics, Malaga was considered a valid setting in which to collect data on sport-related physical activity.

Given that the target research subjects were people who had already used apps when doing sport, only information on sport practitioners using sport apps was collected. Stratified random sampling was used based on the results of the last sport activities study conducted in Spain by the Centro de Investigaciones Sociológicas (2010). Thus, 37% of the present study's sample was sport practitioners who do sport 1 or 2 times a week, 56% was individuals who do sport 3 or 4 times a week and 7% was those who do sport more than 5 times a week. The questionnaire was distributed to every sport practitioner identified until enough information on all three groups was collected.

Using the personal street-intercept method, data were collected randomly during 2019, from February to March, in Malaga's main sport facilities. Six trained interviewers visited

previously identified and selected sport clubs, gyms, aquatic centres and public sport centres and zones to collect data. The final sample consisted of 362 respondents, with a margin of error of 5.15% and a reliability of 95%. The sample profile is shown in Table 1.

Table 1: Sample profile

Variables	Categories	Frequency	Percentage (%)
Gender	Male	210	58
	Female	152	42
Age	18–25 years old	117	32.3
	26–35 years old	137	37.8
	36–45 years old	72	19.9
	46–55 years old	27	7.5
	56–65 years old	9	2.5
Education	Primary school	30	8.3
	Secondary school	122	33.7
	University degree	201	55.5
	No schooling	9	2.5
Marital status	Married	98	27.1
	Divorced	14	3.9
	Common-law partnership	42	11.6
	Single	206	56.9
	Widow or widower	2	0.5
Previous sport app use	<1 year	97	26.8
	1–2 years	127	35.1
	2–3 years	82	22.7
	3–4 years	36	9.9
	4–5 years	8	2.2
	>5 years	12	3.3

As shown in Table 1, the respondents' age and education mainly fall within the categories of between 18 and 45 years (90%) and some education (97.5%), respectively. In general, these results are in line with the sample profiles of the most recent sport activities research conducted in Spain by the Centro de Investigaciones Sociológicas (2010). The cited study found that 69% of the sample was less than 54 years old and 95% had some schooling. The existing literature on sport apps also reports a similar sample profile. For instance, Asimakopoulus et al.'s (2017) study of Fitbit active users was based on a sample with 88.24% of respondents between 18 and 49 years and 100% with some education (i.e. 76.47% with a university degree).

Nevertheless, some differences were found in the distribution of the current research's respondents in specific categories and that of previous studies. For instance, in terms of education, the present sample included mainly individuals with a university degree (55.5%), while the Centro de Investigaciones Sociológicas's (2010) respondents were mainly respondents with primary and secondary schooling (50%).

The final questionnaire was the result of a validation process consisting of two steps. First, five experts in the field of market research reviewed the questionnaire's preliminary version and found any incorrect, inapplicable or incomprehensible wording. Second, the revised questionnaire was used to conduct a pre-test with 10 users. As a result, 2 items were rewritten into 1 item (i.e. social influence), and 1 example was added to ensure respondents could better understand the relevant item.

The final questionnaire was divided into three sections. The first section was dedicated to collecting information about sport app users' characteristics. The second section was focused on obtaining information about users' continuance intention towards sport apps and their use of sport apps in trips. The last section covered attitudinal and norm-based variables.

The survey items (see Appendix 1) were adapted and translated into Spanish, without any backward translation, from previous research's scales. The recommended measures listed in the literature and developed to assess use, continuance intention (Venkatesh et al. 2012), attitude and subjective norm constructs were associated with bipolar like-unlike or agree-disagree Likert scales (Montano and Kasprzyk 2015). These recommendations were followed in the present questionnaire.

PE, EE, continuance intention and use in trips were measured based on 4, 4, 3 and 1 items, respectively, which were adapted from Venkatesh, Thong and Xu's (2012) work. PS was measured based on three items taken from Van Kerrebroeck, Brengman and Willems's (2017) research. PEN was measured based on four items adapted from He, Wu and Xiang's (2018) study. Subjective norms were measured based on three items taken from Venkatesh, Morris, Davis and Davis's (2003) work. Finally, PG was measured based on two items adapted from Tu, Hsieh and Feng's (2018) study. The research model was analysed using structural equation modelling.

4. Results

4.1 Measurement model

To process the data, the PLS method was applied using SmartPLS 3.0 software (Ringle et al. 2015). PLS path modelling's objective is to predict the behaviour of both latent and observable dependent variables in order to maximise the variance explained (R^2) of the dependent variables (Roldán and Cepeda, 2004). In contrast to methods based on covariance, PLS is better adapted for use in predictive analytics and the development of theory, although PLS can also be used to confirm existing theories.

The proposed model included an unusual feature in that it contained a second-order construct – ATB – which cannot be measured by any observable variable or indicator. This feature made a preliminary analysis necessary to evaluate the measurement and structural models. In this phase, the procedures proposed by Wright, Campbell, Thatcher and Nicholas (2012) were used. Given the presence of a second-order construct, the model's evaluation included applying the first part of the methodology proposed by the cited authors, in which the first-order factors function in the model as the second-order construct represented by these factors.

The individual reliability of the measurement model's items was evaluated based on the size of their factor loading (λ). In general, an estimator or indicator is considered acceptable when its loading is equal to or higher than 0.707 on the relevant construct (Barclay et al. 1995; Hair et al. 2011) (see Table 2). Thus, the cross loadings were evaluated to determine to what extent each indicator exclusively measures the intended construct or whether that indicator's loading is greater for another construct (see Table 3). In summary, this step led to the elimination of item X11 because its λ was higher than the threshold value of 0.50 (Hair et al. 2014).

Table 2: Loads, composite reliability and average variance extracted (AVE)

	Loading	Cronbach's Alpha	CR	AVE
ATB		n/a	n/a	n/a
PE		0.958	0.970	0.890
X1	0.897			
X2	0.967			
X3	0.956			
X4	0.952			
EE		0.974	0.981	0.927
X5	0.954			
X6	0.969			
X7	0.964			
X8	0.964			
PS		0.944	0.973	0.947
X9	0.974			
X10	0.972			
PEN		0.955	0.967	0.881
X12	0.929			
X13	0.955			
X14	0.916			
X15	0.954			
PG		0.810	0.913	0.840
X16	0.927			
X17	0.906			
SN		0.959	0.973	0.923
X18	0.952			
X19	0.966			
X20	0.965			
CIU		0.966	0.978	0.937
X21	0.959			
X22	0.973			
X23	0.973			
UIT		1.000	1.000	1.000
X24	1.000			

Note: CR = compositive reliability; n/a = not applicable; CIU= continuance intention use; UIT = use in trips.

Table 3: Cross loading matrix after item elimination

	CIU	EE	UIT	PEN	PG	PS	PE	SN
X1	0.734	0.671	0.432	0.680	0.573	0.694	**0.897**	0.473
X2	0.705	0.680	0.435	0.686	0.566	0.723	**0.967**	0.544
X3	0.702	0.687	0.435	0.681	0.546	0.705	**0.956**	0.541
X4	0.720	0.701	0.453	0.705	0.534	0.726	**0.952**	0.560
X5	0.644	**0.954**	0.438	0.600	0.554	0.706	0.666	0.405
X6	0.678	**0.969**	0.476	0.621	0.557	0.714	0.710	0.448
X7	0.663	**0.964**	0.440	0.623	0.547	0.691	0.711	0.435
X8	0.676	**0.964**	0.443	0.633	0.541	0.697	0.709	0.438
X9	0.801	0.733	0.457	0.743	0.604	**0.974**	0.759	0.520
X10	0.775	0.685	0.449	0.757	0.544	**0.972**	0.709	0.546
X12	0.711	0.586	0.391	**0.929**	0.549	0.714	0.676	0.504
X13	0.753	0.654	0.432	**0.955**	0.574	0.774	0.726	0.497
X14	0.644	0.522	0.411	**0.916**	0.477	0.635	0.620	0.455
X15	0.745	0.642	0.482	**0.954**	0.582	0.760	0.711	0.531
X16	0.622	0.551	0.273	0.555	**0.927**	0.582	0.592	0.266
X17	0.565	0.493	0.349	0.511	**0.906**	0.496	0.481	0.353
X18	0.505	0.435	0.356	0.515	0.329	0.533	0.547	**0.952**
X19	0.479	0.421	0.387	0.493	0.305	0.504	0.520	**0.965**
X20	0.520	0.436	0.410	0.518	0.331	0.540	0.552	**0.966**
X21	**0.959**	0.709	0.477	0.746	0.651	0.790	0.761	0.511
X22	**0.973**	0.649	0.494	0.721	0.631	0.782	0.717	0.508
X23	**0.973**	0.647	0.478	0.745	0.601	0.781	0.722	0.497
X24	**0.499**	0.467	1.000	0.458	0.336	0.466	0.465	0.400

Note: SN = subjective norms.

The model's construct reliability or internal consistency was evaluated through the coefficient of composite reliability (ρ_c) (see Table 2 above). This evaluation is used to confirm the degree to which the observable variables or indicators directly measure the appropriate latent variable. Composite reliability values are considered satisfactory if they fall between 0.60 and 0.70 for exploratory research, but, for more advanced studies, the values must be between 0.70 and 0.90 (Nunnally and Bernstein, 1994). Values under 0.60 indicate a lack of reliability (Hair et al. 2011; Richter et al. 2016).

Next, the model's convergent validity was evaluated (see Table 2 above). This step determines whether a set of indicators represents or measures a single latent construct, based on whether the construct can be reduced to a unidimensional dimension (Henseler et al. 2009). The evaluation is done using AVE. An AVE value higher than 0.50 indicates that an adequate level of convergent validity exists. In other words, more than half of the latent variable's

variance can be explained by its indicators (Hair et al. 2011; Hair et al. 2014). The model's constructs have an average AVE value higher than 0.50.

The third step was an evaluation of the model's discriminant validity to determine to what extent an observable construct differs from other constructs in order to detect any possible overlap. The construct must share more variance with the associated observable variables or indicators than it does with the model's other constructs (Barclay et al. 1995). To carry out this analysis, three procedures were followed.

The first was the application of Fornell-Larcker's criterion (Fornell and Larcker 1981), which requires that the latent construct shares more variance with the appropriate indicators than with the model's other latent variables. In terms of statistics, the AVE of each latent construct should be larger than the variance that it shares with the model's other constructs (Barclay et al. 1995; Hair et al. 2011; Henseler et al. 2009; Richter et al. 2016). Thus, one way to conduct this analysis is to demonstrate that the correlations between the constructs are lower than the square root of AVE (see Table 4).

Table 4: Discriminant validity of first-order constructs – Fornell-Larcker's criterion

	CIU	EE	UIT	PEN	PG	PS	PE	SN
CIU	**0.968**							
EE	0.691	**0.963**						
UIT	0.499	0.467	**1**					
PEN	0.762	0.643	0.458	**0.939**				
PG	0.649	0.571	0.336	0.582	**0.917**			
PS	0.810	0.729	0.466	0.770	0.589	**0.973**		
PEX	0.758	0.726	0.465	0.729	0.587	0.754	**0.943**	
SN	0.522	0.449	0.400	0.530	0.336	0.547	0.562	**0.961**

The second procedure that can be used to determine discriminant validity is less demanding or strict, namely, evaluating cross loadings. The criterion to be met is that each indicator loads more heavily on – or is correlated more closely with – its own construct than on the rest of the model's latent variables (Henseler et al. 2009; Hair et al. 2011). The resulting matrix was evaluated earlier during the process of analysing individual items' existing discriminant validity (see Table 3 above).

Finally, the third procedure involved a recently introduced criterion: heterotrait-monotrait ratio (HTMT). According to HTMT, discriminant validity exists when the correlations

between the constructs are less than 0.85 (Richter et al. 2016). As shown in Table 5, the proposed model's constructs have discriminant validity.

Table 5: Discriminant validity of first-order constructs (HTMT)

	CIU	EE	UIT	PEN	PG	PS	PE	SN
CIU								
EE	).712							
OT	).508	).473						
PEN	).791	).664	).468					
PG	).731	).641	).377	).659				
PS	).848	).760	).479	).809	).672			
PEX	).788	).752	).475	).761	).664	).793		
SN	).542	).464	).408	).553	).383	).575	).586	

After completing the above step, a multidimensional, second-order model needed to be estimated, so the next step consisted of using the aggregate values to model the second-order construct of ATB (Wright et al. 2012). At this point in the process, the proposed model had to take on a different nomological structure, so the measurement model had to be evaluated again. Thus, each item's individual reliability was assessed based on its λ, which, in the case of the second-order construct of ATB, was measured via PE, EE, PG, PS and PEN. These items' λ is higher than 0.60 (Hair et al. 2014). Their composite reliability (ρ_c), in turn, presented values above 0.70 (see Table 6). The items' convergent validity was assessed via their AVE, which has values larger than 0.50 (Hair et al. 2011; Hair et al. 2014).

Table 6: Analysis of second-order model's individual reliability, composite reliability and convergent validity

	Loading	**Cronbach's Alpha**	**CR**	**AVE**
ATB		0.909	0.933	0.736
PE	0.889			
EE	0.853			
PG	0.762			
PS	0.904			
PEN	0.874			

Finally, this model's discriminant validity also presented adequate values when the cross loading matrix was analysed and the Fornell-Larcker and HTMT criteria were applied.

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4.2 Structural model

After the measurement model was evaluated, the next step was to test the structural relationships between the hypothesised variables (see Table 7). A theoretical model's goodness of fit can be determined via the level of statistical significance of the path coefficients (β), that is, the relationships between the constructs and the endogenous constructs' predictability (i.e. dependent variables). The paths' statistical significance can be assessed by using bootstrapping and calculating the amount of variance explained for every dependent construct in the model (R^2).

Table 7: Variance explained and Stone-Geisser test

	R^2	Q^2
CIU	0.723	0.599
UIT	0.250	0.312

If a path is not statistically significant or it has the opposite sign from that proposed in the relevant hypothesis, that hypothesis is not supported. If the path is significant, this result provides empirical support for the postulated causal relationship. An R^2 value of 0.75, 0.5 or 0.25 for the structural model's endogenous variables is considered substantial, moderate and weak, respectively (Hair et al. 2011).

Another method of evaluating the structural model's predictive power is the Stone-Geisser test (Q^2), which uses blindfolding (Hair et al. 2011; Richter et al. 2016). If the value of a specific endogenous latent variable is greater than zero, this construct has predictive relevance (Hair et al. 2011). As can be seen in the above table, this procedure's application revealed that both CIU and UIT have predictive validity.

The last step was to analyse the β coefficients or weights of the standardised regression coefficients that help verify to what extent the predictive variables contribute to the variance explained of the endogenous variables. This analysis corroborates whether the proposed hypotheses are statistically significant (Hair et al. 2011). The present analyses' results are shown in Table 8, which confirms that all the hypotheses defined received empirical support.

Table 8: Results for structural model

Hypothesis	*β* Coefficient	*T* Statistic	*P*-Value	2.5%	97.5%	Supported
EE → ATB	0.874	43.934	**0.000**	0.278	0.304	Yes
PEN → ATB	0.881	44.307	**0.000**	0.277	0.302	Yes
PG → ATB	0.719	21.392	**0.000**	0.103	0.124	Yes
PS → ATB	0.885	44.603	**0.000**	0.153	0.168	Yes
PE → ATB	0.905	43.773	**0.000**	0.283	0.310	Yes
ATB → CIU	0.723	7.178	**0.000**	0.472	0.837	Yes
SN → CIU	0.723	2.239	**0.024**	0.036	0.389	Yes
CIU → UIT	0.251	12.463	**0.000**	0.414	0.571	Yes

To confirm the above findings, a non-parametric technique was applied: confidence intervals. According to Henseler et al. (2009), 'if a confidence interval for an estimated path coefficient β does not include zero, the hypothesis that β equals zero is rejected.' The procedure's application in the current study confirmed the previously obtained results (see Table 8 above).

Based on these results, the proposed structural model was considered valid, and thus the results confirm that continuance intention towards sport apps is a predictor of the use of sport apps in trips (H8). In turn, this continued use of sport apps is explained by subjective norms (H7) and users' attitude towards this behaviour (H6). The path coefficients' magnitude and statistical significance show that these hypotheses are compatible. The coefficient for the path from ATB to continuance intention is $\beta = 0.723$ ($t = 7.178$) and, for the path from subjective norms to continuance intention, is $\beta = 0.723$ ($t = 2.239$). These path coefficients confirmed that continuance intention towards sport apps similarly depends on the proposed predictors.

In addition, ATB associated with the continued use of sport apps can be explained based on PE (H1), EE (H2), PS (H3), PEN (H4) and PG (H5). The magnitude and statistical significance of the path coefficients again shows that the hypotheses are compatible. The coefficient for the path from EE to ATB is $\beta = 0.874$ ($t = 43.934$), from PEN to ATB $\beta = 0.881$ ($t = 44.307$), from PG to ATB $\beta = 0.719$ ($t = 21.392$), from PS to ATB $\beta = 0.885$ ($t = 44.603$) and from PE to ATB $\beta = 0.905$ ($t = 43.773$). These path coefficients confirm that users' attitude towards the continued use of sport apps also depends on all the proposed predictive variables.

5. Conclusions, limitations and future lines of research

This study focused on developing a model in order to achieve the research objective of identifying the causes of a sport practitioner community's use of sport apps in trips. The

results help bridge the gap identified in the literature review conducted for this study, which revealed that previous studies have addressed the use of sport apps and users' wellbeing (Macias et al. 2015; Depper and Howe, 2017; Peever et al. 2017; Dallinga et al. 2018). However, many aspects remain underresearched regarding the reasons for sport app use among tourists. In addition, no evidence was found of research that has analysed the antecedents of sport app use in trips.

The proposed model defines the critical factors for mobile sports app use during trips by individuals who use these apps in their daily life. According to the model and in line with previous research on technology use in everyday life and travels (Pearce 2011; Pearce and Gretzel, 2012; Wang et al. 2016), mobile sport app use in trips is motivated by the habitual use of sport apps in daily life. That is, sport practitioners – whether professionals or just individuals with healthy habits – who use sport apps as part of their everyday routines are also predisposed to use the apps when doing sport during holidays. These travellers still want to improve their wellbeing during holidays.

An everyday use of mobile sport apps is in turn promoted by subjective norms and by these individuals' attitudes towards the regular use of sport apps. Thus, this tendency to engage in continuous use can be explained by attitudinal and subjective norm-based variables, which is in line with the literature on users' intention to use sport apps (Song et al. 2018) in other contexts. These variables are users' expectations of these apps' performance, the effort required to use apps, users' satisfaction with apps, the enjoyment generated by app use and, finally, apps' gamification.

The proposed model was inspired by the existing literature on mobile app use in tourism and sport. All the variables outlined in this literature were shown to be correlated, except for the variable assessed by item X11: 'My experience with this app was not what I thought it would be.' This item was developed to appraise PS, as well as some other variables. This was the only variable measured that behaved in a way contrary to what was expected, so its lack of validity within the proposed model could well be due to respondents' misunderstanding of this item. This confusion may have been the result of the survey items being translated from the English-language literature on mobile app use and the step of backward translation being omitted.

To confirm whether this was the problem, the questionnaire was further administered in person to 20 people during the phase in which the previously collected data was analysed. Eight of these respondents had problems interpreting the reverse item. Thus, the questionnaire had already been previously validated when the respondents' difficulty was first noted after the main study was completed, which meant that the problem was not detected until the field work finished.

The solution implemented was to eliminate the confusing item and assess the PS construct with the remaining items. This problem underlines the importance of questionnaire design in empirical research such as the one discussed above and suggests that the way in which variables are measured should not be altered. That is, each scale's approach needs to be kept internally consistent so that the items are either all reverse or direct.

5.1 Theoretical implications

The empirical tests' results corroborated the TRA. The use of structural equations appears to provide an adequate explanation for the specific behaviour under study, namely, mobile sport app use in trips. Thus, this research joins the long list of investigations that have validated the adequacy of the TRA model in terms of explaining the use and users' acceptance of new technologies. In addition, the present results confirm that the construct of attitude – a second-order construct in the model – can be explained by PE, EE, PS, PEN and PG when they function as behavioural beliefs and outcomes.

However, other existing models such as the UTAUT, UTAUT2, technology acceptance model (TAM) or theory of planned behaviour (TPB) have also been confirmed as useful to researchers seeking to explain technology acceptance (Venkatesh et al. 2003; Venkatesh et al. 2012). The present study should thus be expanded to compare the usefulness of other models specifically in terms of predicting the acceptance and use of mobile sport apps in trips. These models could also be applied to explore which other attributes can trigger these behaviours.

5.2 Practical implications

The above results offer interesting indications for how destinations and tourism companies can increase their offers' value based on athletes' intention to use sport apps during their holidays. In line with previous studies of guests' co-creation of experiences and wellbeing

(Stankov and Filimonau, 2019), the present findings suggest that destinations can enrich their offer of leisure activities by creating online content about routes, trails and paths, which can be uploaded to the most popular apps. Another option is for destinations to facilitate interactions between residents who do sport and sport tourists so that they can together generate content or exchange information about their routes, circuits or routines.

Naturally, visitors' intention to use sport apps would require destinations to ensure good coverage by communication systems, for example, guaranteeing a 4 or 5G network. However, some sport app services can function with a GPS that does not require mobile phone coverage. Tourism companies, in turn, need to make their sport zones (e.g. their gym equipment) compatible with users' apps and allow these clients to transmit information to workout equipment from the cloud or from equipment to the cloud.

Furthermore, tourism companies interested in promoting wellbeing and sport practice during holidays should take into account that sport apps use in trips is predicted by ATB and SN variables. Taking PE, EE, PS, PEN, PG and SN into account when defining apps for sport purposes and use in holidays is essential as a way to promote CIU sport apps use even during trips, thereby promoting sport app use in trips and wellbeing. For instance, when designing gym equipment or organising sport activities, tourism companies can rely on sport apps to enhance enjoyment or gamification with social interactions, records recognition or other pleasurable elements.

5.3 Limitations and future research

Special care was taken in the selection of the city where the field work was conducted and in the stratification and collection of data from a sample that matched the general profile of Spain's sport practitioners. Nonetheless, this research presented limitations associated with empirical studies such as the sample's size and local character (i.e. residents of a medium-sized city in Spain) or the heavy concentration of respondents in the category of university degrees. One future line of research could thus be to compare the present results with those for other geographical areas with similar characteristics in order to increase the sample's size or, alternatively, include different types of areas (e.g. large cities or non-Mediterranean or European cultures).

The newness of technology use in sport and the constant advancements made mean that the current study's approach needs to be applied through further research. This study's focus could be narrowed down to a specific type of sport practice (e.g. sea, outdoors, group and gym activities), as well as to athletes with specific profiles (e.g. youths, families, men, women and nationalities). Similarly, other related research could focus on finding new variables that influence sport apps use in trips or, as mentioned previously, on applying other explanatory models of technology use other than the TRA.

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Appendix 1: Measurement instrument

Constructs	Items	Measures
User characteristics Adapted from Ruiz, et al. (2010) and Vallespín et al. (2017)	X0.1: Age	Range: 18–25/26–35/36–45/46–55/56–65/65 or more years old
	X0.2: Gender	Male/female
	X0.3: Education	No schooling/primary school/secondary school/university
	X0.4: Marital status	Single, married/widow or widower/divorced /common-law marriage
	X0.5: Experience using sport apps	None/< 1 year/1–2 years/2–3 years/4–5 years/> 5 years
Performance expectancy Adapted from Venkatesh et al. (2012)	X1: I find my sport app useful. X2: Using my sport app increases my chances of achieving important personal objectives. X3: Using my sport app helps me achieve objectives more quickly. X4: Using my sport app enhances my outcomes.	
Effort expectancy Adapted from Venkatesh et al. (2012)	X5: Learning how to use my sport app is easy. X6: How to interact with my sport app is obvious and easy to understand. X7: I find my sport app easy to use. X8: It is easy for me to become competent in the use of my sport app.	
Perceived satisfaction Adapted from Van Kerrebroeck et al. (2017)	X9: I am satisfied with my experience with the app I normally use. X10: My experience with this app is just what I needed. X11: My experience with this app has not been what I expected.	
Perceived enjoyment Adapted from He et al. (2018)	X12: I look forward to using this sport app. X13: I really enjoy using this sport app. X14: Using this sport app is exciting. X15: Using this sport app is pleasurable.	7-point Likert scale (1 = 'Strongly disagree'; 7 = 'Strongly agree')
Perceived gamification Adapted from Tu et al. (2018)	X16: My sport app includes rewards and recognition of personal records achieved. X17: My sport app includes the possibility of interacting with other users.	
Subjective norms Adapted from Venkatesh et al. (2012)	X18: People who are important to me think I should use my sport app. X19: People who influence my behaviour think I should use my sport app. X20: People whose opinion I value prefer that I use my sport app.	
Continuance intention Adapted from Song et al. (2018)	X21: If I can, I will continue to use my sport app in the future. X22: It is likely that I will continue to use my sport app in the future. X23: I expect to continue to use my sport app in the future.	
Use in trips Adapted from Venkatesh et al. (2012)	X24: Please select the number that best describes the frequency with which you have used your sport app in trips during the last five years.	7-point Likert scale (1 = 'Never'; 7 = 'Always')