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Experience with Travel Mobile Apps and Travel Intentions—The Case of University Students in China

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Abstract: The popularization of smart phones has fostered the use of e-hailing apps, which can effectively reduce information asymmetry and provide ease and convenience during travel. Meanwhile, problems such as product homogeneity, slow operation speed, and interface confusion in travel apps also exist, leading to negative user experience. Building on the theory of planned behavior and technology acceptance model, this study examines multiple features of travel apps and their influence on university students' experience and travel intentions. Findings of the study suggest that, compared to the contents of travel apps, the ease of use seems to have a stronger influence on students' attitude, perceived behavioral control, and travel intention. The study contributes to the integration of the technology acceptance model and the theory of planned behavior in travel contexts. The findings also offer meaningful practical implications and recommendations on product and service design to relevant stakeholders willing to offer a better travel app user experience.

Keywords: e-hailing app; service experience; willingness to travel; influencing factors

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1. Introduction

With the development of the internet, 5G mobile communication technology, and enhanced smartphone performance, the number of internet and mobile phone users has greatly increased in China. According to a recent report released by the China Internet Network Information Center, the number of internet users had reached 940 million as of June 2020 [1]. In particular, 932 million (99.2%) users can access the internet by phone [2]. In May 2019, Qunar released a "report on the travel data of college students in 2019" and drew travel consumption portraits of 2.6 million college students registered on the website. The results showed that, in 2018, the average college student traveled 4.4 times a year, which was much higher than the average travel frequency (1.35 times per year) of the population in general. In addition, their total consumption spent on travel increased by 40% in 2017, making them the fastest growing group for travel consumption. In May 2021, Qunar (a Chinese travel website) released the 2021 travel report during the May Day holiday, which showed that those born post-1990s accounted for more than 50% of the May Day travel crowd. Considering the fact that generation Z (people born between 1995 and 2010) only accounts for 15% of the total population, those born post-1990s, who are mainly college students and young professionals, have indeed become the absolute main source market for travel. Moreover, compared with the same period in 2019, the travel growth rate of people born between 1995 and 2000 was 1.85 times, and the growth rate for people born after 2000 was 2.5 times. People born in the early 2000s are mostly college students, and, thus, they have become the fastest growing and most energetic group in travel. Yet, there is limited research attention focusing on college students' travel preferences and behaviors [3], indicating an important research gap that needs to be addressed. In addition, market research also shows college students using tourism mobile apps a lot more frequently than travelers from other age groups. Therefore, it is timely to examine

what roles travel apps play in college students' travel planning, experiences, and travel behaviors.

Software providers have also seized this opportunity and have been constantly enhancing functions and upgrading the interfaces of existing mobile apps to create more user-friendly experiences [4]. In addition, many new mobile apps have been developed to meet businesses' and customers' varied needs. As travel has become an increasingly important part of Chinese consumers' day-to-day lives [5], many mobile apps are travel-related, offering information and support essential for people at different stages of travels, and, thus, have attracted a large number of users. Travel mobile apps, given the convenience and ease of use they offer, have become one of the most popular types of travel app among Chinese consumers. For instance, there are more than 100 e-hailing apps in China, with a total of 340 million registered users (Statistical Report on the Development of the Internet in China, 2020) [1]. Yet, only two apps, Didi Dache and Kuaidi Taxi have more than 9 million users registered, covering more than 40 major cities in China [6].

The applications of various mobile-side travel apps have brought great convenience to Chinese consumers' travel and have gradually become the preferred tools for assisting travel planning and activities. The popularity of travel mobile apps has also drawn growing interest from researchers. For instance, Lu et al. found that ride hailing can offer great convenience for passengers' daily travel and save passengers' travel time [7]. Wang's study of a third-party taxi-hailing app's service model found that passengers can make advance reservations via mobile apps rather than waiting on the roadside [7]. Travel mobile apps can meet the differentiated and personalized needs of passengers through different interface designs and modules compared with traditional taxis, providing great convenience for passengers who find it inconvenient to travel. For instance, Didi Chuxing officially launched the "Didi Taxi for the Elderly" service in 2016. This allows family members and friends to pre-set up as many as nine travel destinations for elderly passengers, which provides great ease, as elderly travelers often find mobile phone apps less accessible. In addition, the platform made the module font size larger to adapt to the needs and habits of the elderly, thus, gaining a lot of support from this market segment [8].

On the one hand, travel apps provide great convenience; on the other hand, the competition in this field has intensified as many new apps have been introduced. As auxiliary tools that meet the travel needs of users, the competitiveness of mobile travel apps comes from user friendliness [9], which is supported by sound technology, sensible design, travel information support, and many other elements. The service experience of mobile travel apps greatly determines customers' acceptance and willingness to use the app again [10]. Therefore, it is necessary to study customers' experience with travel mobile apps. A review of previous literature on travel apps or e-hailing apps revealed that most studies assessed consumers' experiences using a theoretical framework, such as the technology acceptance model and theories of information system adoption [10,11]. In addition, many studies were descriptive in nature or focused on general consumers rather than travelers [12]. Studies incorporating two or more theoretical perspectives and examining travelers' experience are lacking. As an important part of travel activities, the decision to choose between multiple pieces of software is not only determined by the technological ease of use but also other aspects that may influence consumers' attitudes and perceived behavioral control [13]. In addition, despite the popularity of e-hailing apps and their growing importance in Chinese consumers' travel plans, limited research attention has been devoted to this market.

Given such a backdrop, our research aims to assess Chinese travelers' perception of popular travel apps and determine whether these apps' performance can influence travelers' attitude and behavioral intentions. The study contributes to both the technology acceptance model and the theory of planned behavior by creatively integrating the two theoretical perspectives. This is innovative because mobile apps have become increasingly important in Chinese travelers' travel and consumption decisions at different stages of their travel experience, ranging from booking tickets and accommodation, using local transportation,

ordering food deliveries, etc. Assessing how the technical performance of mobile apps can influence the planned behaviors of travelers makes a meaningful contribution to existing theories. This research can help to enhance the understanding of the experience of travel mobile app usage in terms of the roles played by different aspects of travel mobile features and how they influence consumers' attitude, intention, and actual usage of mobile apps, offering a more comprehensive explanation of travelers' experience and decision making. In addition, this study focuses on a unique but important market segment, university and college students in China. The market size of the segment reached 36 million in 2020, and they are the most important consumer group for the nation's economy, not only in travel but in many other aspects. On the other hand, this group of consumers grew up with various technologies and mobile apps. Therefore, understanding their experience with travel mobile apps is critically meaningful, because, from a practical perspective, the findings of the study can serve as important references for travel mobile app providers. They can help them to better understand customers' experiences with travel mobile apps, identify the strengths and issues existed in current mobile apps, and design new products or enhance existing apps to better satisfy customers' needs. Further, such an enhanced understanding is critical as it determines whether destinations and suppliers can attract the attention of this market segment. Therefore, the findings of this study will have important practical implications in product design and the promotion of various travel stakeholders.

2. Theoretical Basis and Research Hypotheses

2.1. Travel Mobile Apps and Development

Mobile apps only started to appear fairly recently. In 2009, the world's first mobile taxi-hailing company, Uber, was founded in the United States. As the most popular e-hailing platform, the total number of trips in the fourth quarter of 2019 reached 1.9 billion, and, even with the pandemic's influence, the total number of trips in the fourth quarter of 2020 reached 1.4 billion. At this moment, Uber accounts for 69% of the U.S. online car-hailing market, followed by Lyft (28%), leading the U.S. online car-hailing industry (SecondMeasure, 2018). Travel mobile apps started to appear in China in 2012. Since they can accommodate the needs of both passengers and taxi drivers, travel apps quickly became popular thereafter. According to the latest statistics, the number of online car-hailing users in China has reached 340 million (Statistical Report on the Development of the Internet in China, 2020). Competition in this market is also fierce, with more than 100 travel apps available. However, Didi and Kuaidi are leading the market, with 180 million users [8]. Using mobile apps has gradually replaced traditional ways of waving and calling for taxis in China [14].

The popularity of mobile travel apps and their importance in people's daily lives and travel have also attracted growing research attention. As shown in Table 1, the majority of studies focused on the influencing factors relating to consumers' willingness and behavioral intentions when using mobile apps.

Table 1. Variable measurement items and their sources.

Variable		Serial Number	Measurement Item
Content-aware usefulness	Functional text information	FT1	Overall, the text information of the travel app is satisfactory
		FT2	The travel APP provides a variety of travel modes
	Motivational visual message	MV1	The interface display of this travel app makes me interested in using it
Technology-aware ease of use	Easy to learn function	EL	I hardly get confused when I use this travel app
	Easy-to-understand operation	EU	The gesture operation mode of the travel app is easy to understand
	Easy human–machine interaction	EI	The travel app is flexible in design and easy to interact with
	Information search is easy to implement	ES	This travel app allows me to quickly find the target vehicle
	Overall perceived ease of use	OPEU	Overall, I think the travel app works well
Perceived behavioral control		PBC1	I have control over the travel app
		PBC2	My city has invested resources in this travel app
		PBC3	I have the knowledge needed to use this mobility app
Use propensity attitude		ATU	In the future, I will continue to use this travel app
Willingness to travel		T11	I guess this travel app will increase the number of trips I make
		T12	If time permits, I will travel more often
		T13	If funds allow, I will travel more often
		T14	If God wants, I will travel more

2.2. Theoretical Perspectives on Travel Mobile App Usage

There is no doubt that information technology can help people to improve the quality of their decision making. However, before making a decision to adopt a travel app, users have to generate a willingness to use, which is affected by a variety of factors. Researchers, thus, have investigated factors motivating people's willingness and usage of information technology in travel, including usage of travel mobile apps, from various perspectives. Two theoretical perspectives stand out and are more popular among the others: the theory of planned behavior (TPB) and the technology acceptance model (TAM) [15–17].

2.2.1. Travel Mobile App Usage from TPB Perspective

The theory of planned behavior (TPB) was derived from the theory of reasoned action (TRA) [18], which proposed that people are rational and make decisions through systematic considerations with all available information [19]. Ajzen further suggested that individuals' behavior intentions are affected by attitudes, perceived behavior control, and subjective norms [18], which further influence individuals' actual behaviors (Figure 1). The TBP framework has been applied in various contexts since its introduction, such as in relation to consumer choices of products [20], e-commerce [21], recycling and waste reduction behavior [22], and green product consumption [23] In particular, it has become one of the most popular frameworks that is used to explain travel-related behaviors [24,25], such as outbound-travel decision making and transportation choices [26,27], shopping decisions [28], intention to choose green hotels [29], and the adoption of tourism- and travel-related technologies [30].

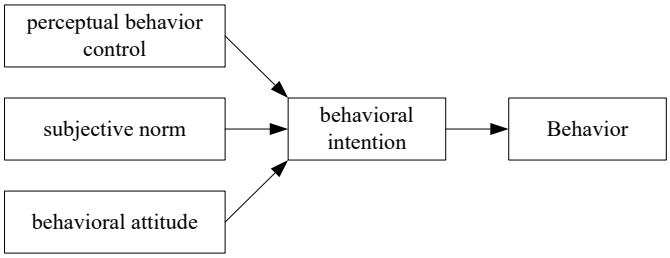

Figure 1. Theory of planned behavior (TPB).

In the context of tourism technology usage, Hung et al. studied users' willingness to use mobile business systems and found that subjective norms and attitudes have a direct impact on users' willingness to use [31]. Xi et al. investigated tourist destination Facebook's influence on tourists' travel intentions from a TPB perspective [32]. Zheng and Zhang investigated how knowledge-sharing behaviors via WeChat, the most popular chatting mobile app in China, influence tourists' travel-related decisions [33]. It is also worth noting that the majority of existing research in China has focused on technology application, behavior selection, and continuous use behaviors.

Another trend in the application of TPB is its integration with other models or theoretical perspectives. For instance, Meng and Choi incorporated the elaboration likelihood model (ELM) into the TPB framework to analyze tourists' willingness to use location-based services in tourism attractions and found that individuals' attitude toward a behavior, subjective norms, and perceived behavior control are significant predictors of behavioral intention [34]. Yang integrated the uses and gratifications theory (UGT) and norm-activation theory (NAM) with TPB and explored how environmental information-sharing behaviors on WeChat influence Chinese tourists' travel-related attitude and decisions and found that Chinese WeChat users' environmental information-sharing behavior is motivated by both egoistic factors (self-presentation, information seeking, and socializing) and altruistic factors (awareness of consequences and ascription of responsibility) [35]. As technologies and travel apps are playing increasingly important roles in travel-related decisions, a growing number of studies have integrated the technology acceptance model (TAM) with TPB, and the main propositions and applications of this model are presented in the following section.

2.2.2. Travel Mobile App Usage from TAM Perspective

The technology acceptance model (TAM) was proposed by Davis to study users' acceptance of information technologies [36]. This model suggests that perceived ease of use and perceived usefulness jointly influence users' attitude, behavioral intention, and actual usage of certain technologies. Perceived usefulness refers to the extent to which an individual perceives a system or technology to be beneficial. Perceived ease of use refers to the individual's perception of how easy it is to operate or use a system or technology [37]. Perceived ease of use affects perceived usefulness, and both are further affected by external variables, such as design features and the content of systems and technologies (see Figure 2). Researchers have suggested that the TAM model has high predictive validity in relation to users' technology acceptance [38,39], leading to the wide application of the model in various contexts relating to users' technology acceptance, such as acceptance of information systems [40], information technology [41], online shopping websites [42], online teaching [43], health service technologies [44], online payment models [45], social media user information release [46], and technologies and innovations in tourism contexts [47].

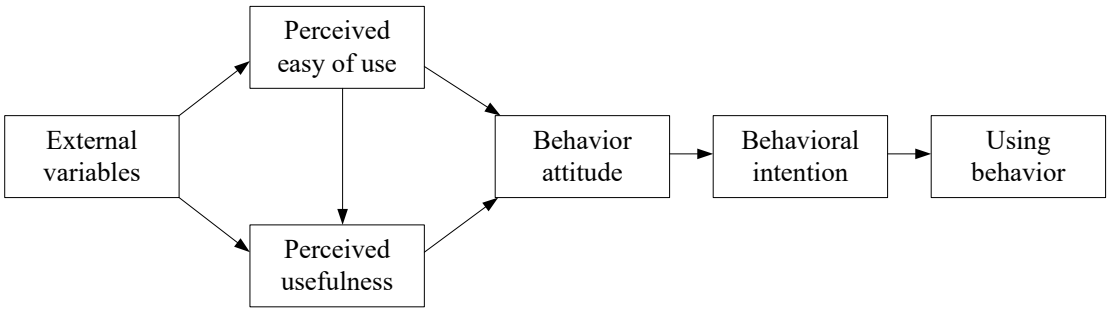

Figure 2. Technology Acceptance Model.

In travel and tourism contexts, Balouchi et al. suggested that enjoyment, the credibility of the source, and perceived risk jointly influence technology adoption in travel planning [48]. In restaurant contexts, Lee et al. applied the TAM model to investigate customers' acceptance of service robots and found that customers' perception of usefulness, perception of ease of use, and attitude towards service robots have a positive impact on their acceptance intention [49]. In addition, the customer's trust in the service robot and the quality of the service robot itself can also positively affect the customer's perception of usefulness. In addition, Roberto et al. suggested that, in addition to the basic variables of the TAM model, trust, connectivity, and individual personality also influence tourists' purchase intention [50,51]. Wang introduced the concept of technological consistency into the TAM model and believed that technological consistency has an impact on consumers' willingness to use smartphones during air travel [52,53]. Sagnier et al. further expanded the TAM model and introduced hedonic quality and individual innovation as important factors influencing users' willingness to accept VR technology [54]. In addition, demographic variables, such as age and gender, were also investigated, and findings suggested that intention to use VR is positively influenced by perceived usefulness and negatively influenced by cybersickness [55].

2.2.3. Innovative Integration of TPB and TAM in the Study of Travel Mobile Apps

While the TPB focuses on factors affecting individual's behaviors in general, the TAM model focuses on users' technical acceptance and usage in particular. In theory, it is possible to integrate the two models in studies relating to factors affecting users' technology acceptance and usage. Although research efforts integrating these two frameworks have also been observed in contexts such as online education [15], bike sharing [56], and drone food delivery services [57], limited research attention has been paid in the context of travel apps [58], leaving an important research gap that needs to be addressed. In addition, given the importance of the internet and travel apps in college and university students' daily life and travels, it is critical to bring a technology perspective into the travel planning process of college/university students guided by the TPB model [59].

Further, Ajzen also suggested that a number of background factors serve as antecedents of individuals' attitude, subjective norms, and perceived behavioral control [13]. Given the technology-focused nature of the TAM [60], we propose that perceived ease of use and perceived usefulness serve as antecedents of key constructs contained in the TPB model [61]. In particular, we propose that the perceived usefulness and ease of use of travel apps jointly influence potential users' attitude and perceived behavioral control towards the travel app, which, in turn, influence their intention to use the travel app (Figure 3). We propose specific hypotheses and support them with justification in Section 2.3.

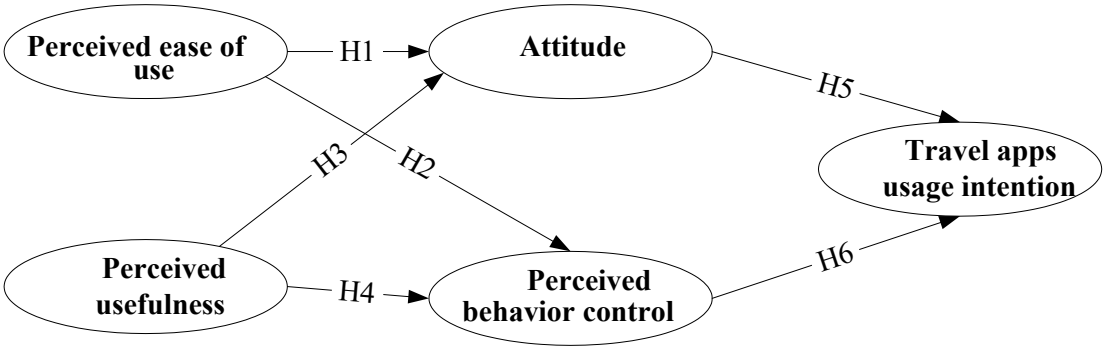

Figure 3. Conceptual model.

2.3. Hypotheses Development

2.3.1. Perceived Ease of Use, Attitude, and Perceived Behavioral Control

Perceived ease of use refers to the difficulty of using a technology or system [33]. Researchers have suggested that perceived ease of use is positively related to users' attitude [62], which further influences their adoption intention and actual behavior [63]. In the context of travel apps, we propose:

Hypothesis 1 (H1): *Perceived ease of use of travel mobile apps is positively associated with users' attitude toward travel apps*.

Hypothesis 2 (H2): *Perceived ease of use of travel mobile apps is positively associated with users' perceived behavior control*.

2.3.2. Perceived Usefulness of Content, Attitude, and Perceived Behavioral Control

Perceived usefulness refers to the degree to which the individual perceives that the application of a certain technology can help to solve problems. Researchers have suggested that the perceived usefulness can directly affect potential users' attitude and further enhance their willingness to use [64,65]. In a study on library mobile apps, Xu and He found that, when users believe using mobile services apps can benefit their work and lives, their willingness to use the apps grows [66]. In education contexts, Baudier et al. found that the perceived usefulness of education-related technologies can positively affect the acceptance behavior of college students [67]. Useful contents can help users to gain more information and knowledge, thus, enhancing their sense of control in travel-related decisions. Therefore, we propose:

Hypothesis 3 (H3): *Perceived usefulness of travel mobile apps' contents is positively associated with potential users' attitude toward usage*.

Hypothesis 4 (H4): *Perceived usefulness of travel mobile apps' content is positively associated with perceived behavior control*.

2.3.3. Attitude, Perceived Behavioral Control, and Intention

An individual's attitude and perceived behavioral control, according to the TPB model [16], can further influence their behavioral intention and actual behaviors [68]. This effect has been repeatedly observed in various contexts, such as mobile phone usage [69], online video subscriptions bicycle sharing [70,71], outbound-travel decision making [72,73], tourists' pro-environmental behavior [74,75], and tourists' shopping behaviors at international airports [76]. In the context of travel mobile app usage, we propose that:

Hypothesis 5 (H5): *Attitudes toward travel mobile apps are positively associated with potential users' willingness to use*.

Hypothesis 6 (H6): *Perceived behavior control of travel mobile apps is positively associated with potential users' willingness to use.*

3. Research Method

Measurements and Data Collection

A questionnaire containing two section was designed for data collection. Section I collected information on respondents' demographic variables; section II collected information on respondents' perceived technology acceptance, attitude, norms, perceived behavioral control, and behavioral intention. All measurements were adapted from previously validated scales (Table 2). All variables were measured using a 5-point, Likert-type scale, with 1 = strongly disagree, and 5 = strongly agree.

Table 2. Reliability and convergence validity of the scale.

Latent Variable	Observational Variable	SFL	CR	AVE	Cronbach's α
Content-aware usefulness	FT1	0.919	0.938	0.834	0.938
	FT2	0.920			
Technology-aware ease of use	MV	0.901	0.954	0.805	0.954
	EL	0.858			
	EU	0.910			
	EI	0.914			
	ES	0.876			
	OPEU	0.925			
Perception behavior control	PBC1	0.921	0.914	0.780	0.907
	PBC2	0.808			
	PBC3	0.916			
Attitude toward use orientation	ATU1	0.933	0.820	0.932	0.929
	ATU2	0.867			
	ATU3	0.915			
Travel intention	T11	0.847	0.937	0.788	0.936
	T12	0.911			
	T13	0.890			
	T14	0.901			
Overall KMO value of the scale: 0.968			Cumulative variance contribution rate: 77.838		

Content-aware usefulness was measured using two items from Hua et al., 2019. An example item is "the interface display of the travel app makes me interested in using it". The Cronbach's alpha of the scale was 0.938.

Technology-aware ease of use was measured using six items from Hua et al., 2019. A sample statement is "the gesture operation mode of the travel app is easy to understand", and the Cronbach's alpha was 0.954.

Attitude toward use orientation was measured using three items from Hua et al., 2019. An example statement is "I will continue to use this travel app in the future", and its Cronbach's alpha was 0.929.

Perception behavior control was measured by three items from Hua et al., 2019. An example statement is "I have control over the travel app", with a Cronbach's alpha of 0.936.

Travel intention was measured using four items from Hua et al., 2019. An example statement is "if time permits, I will travel more times", with a Cronbach's alpha of 0.904.

Data were collected online using a survey platform called Questionnaire Star from 28 March to 12 April 2020. Questionnaire Star is currently the world's largest, free questionnaire survey website, which is widely used by research studies published in reputable journals in various research fields [77–80]. The Questionnaire Star sample database covers

over 2.6 million registered users, allowing authentic, diverse, and representative samples [63]. Participants can scan quick-response (QR) codes to access an electronic consent form and the online questionnaire or access the survey via a unique link. To avoid duplicate responses, the Questionnaire Star tool only allows each mobile device to access the online questionnaire once [81]. Screening questions were used in the survey, and only college and university students were directed to the next step of survey. The final sample consisted of 719 respondents after quality control check procedures to exclude invalid responses. Descriptive analysis and structural equation modeling were performed using SPSS and AMOs software.

4. Findings

4.1. Profile of Respondents

Of the 719 respondents, 20.45% were male and 79.55% were female. In terms of age groups, freshmen accounted for 30.04%; sophomores accounted for 29.54%; juniors accounted for 21.27; seniors accounted for 10.02%; and graduate students accounted for 9.13%, of which freshmen accounted for the largest proportion.

This survey set up related questions to investigate the frequency of travel app use by college students. The results found that college students use travel apps more frequently. In all 719 samples surveyed, 88.7% of students chose "frequently use travel apps". Of the students, 8.9% chose "occasionally use the travel app", and only 2.4% of the students chose "do not use the travel app".

4.2. Collinearity, Reliability, and Validity Test

Structural equation modeling was performed, and the model showed satisfactory overall fit (chi-square/df = 4.752; TLI = 0.963; RMR = 0.020; CFI = 0.969; NNFI = 0.963; IFI = 0.969; SRMR = 0.0257), which warranted the following hypotheses testing. Confirmatory factor analysis was performed, and the results showed that the AVE values were all greater than 0.5, and the CR values were all greater than 0.7, indicating that the scale has high aggregation validity and good convergence validity. The Cronbach's alpha coefficient of each dimension of the scale was between 0.907 and 0.954 (>0.8 has high reliability). This showed that the reliability of the research data was high (Table 2).

4.3. Hypotheses Testing

The maximum likelihood estimation method was used to estimate the path coefficients between the various factors in the structure model, and the result is shown in Figure 4 and Table 3. All six hypotheses proposed were supported. In particularly, the relationship between the ease of use had a positive and much stronger influence on user attitude (β = 0.627 ***) and perceived behavioral control (0.819 ***) than content usefulness' influence on user attitude (0.238 ***) and perceived behavioral control (0.0151 *). User attitude had a much stronger influence on travel intention (0.619 ***) than perceived behavioral control (0.245 ***).

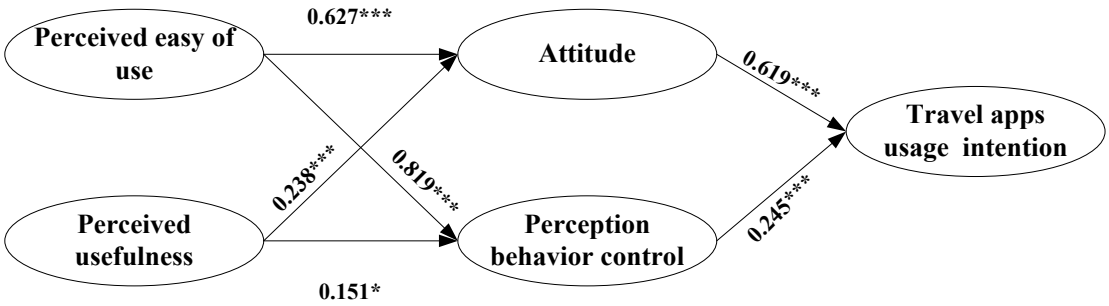

Figure 4. Results of hypotheses testing. *** $p < 0.001$, * $p < 0.05$.

Table 3. Path inspection table.

Hypothesis	Hypothetical Path	β	Critical Values	*p*	Results
H1	Perceived ease of use→Attitude	0.627	9.826	***	Support
H2	Perceived ease of use→Perception behavior control	0.819	15.627	***	Support
H3	Perceived usefulness→Attitude	0.238	3.761	***	Support
H4	Perceived usefulness→Perception behavior control	0.151	3.237	0.001	Support
H5	Attitude→Travel apps usage intention	0.619	11.854	***	Support
H6	Perception behavior control→Travel apps usage intention	0.245	4.904	***	Support

Note: *** indicates a *p*-value < 0.001.

4.4. Gender's Moderating Effect Test

In order to explore whether gender had a moderating effect in this study, the model was investigated through the method of hierarchical regression. First, the scores of each variable were centralized (that is, the mean value was subtracted); secondly, the interaction terms of each variable were generated; finally, hierarchical regression analysis, by adding explanatory quantities (ΔR^2) or interaction terms, was performed. Whether the regression coefficient was significant was used to judge whether gender had a moderating effect (Table 4).

Table 4. Analysis of the moderating effect of gender.

Dependent Variable	Variable	B (β)	ΔR^2	ΔF
Attitude toward use orientation	Gender	0.068 (0.035)	0.613	568.046 ***
	Technology-aware ease of use	0.813 (0.795) ***		
	Gender * Technology-aware ease of use	−0.028 (−0.016)	0.000	0.301
Attitude toward use orientation	Gender	0.067 (0.035)	0.555	446.203 ***
	Content-aware usefulness	0.695 (0.730) ***		
	Gender * Content-aware usefulness	0.055 (0.032)	0.001	1.127
Perceived behavior control	Gender	0.018 (0.009)	0.787	1324.922 ***
	Technology-aware ease of use	0.883 (0.867) ***		
	Gender * Technology-aware ease of use	0.067 (0.038)	0.001	3.190
Perceived behavior control	Gender	0.007 (0.004)	0.668	719.985 ***
	Content-aware usefulness	0.744 (0.783) ***		
	Gender * Content-aware usefulness	0.108 (0.063) *	0.003	5.786 *
Travel intention	Gender	0.049 (0.024)	0.603	544.611 ***
	Attitude toward use orientation	0.806 (0.752) ***		
	Gender * Attitude toward use orientation	0.095 (0.047)	0.002	2.896
Travel intention	Gender	0.102 (0.049)	0.535	411.908 ***
	Perceived behavior control	0.793 (0.739) ***		
	Gender * Perceived behavior control	−0.014 (−0.008)	0.000	0.058

* $p < 0.05$, *** $p < 0.001$.

As can be seen from the above table, the regression coefficients of each interaction term basically reached the significance level, and the new explanation amount (ΔR^2) after the

interaction term was introduced reached the significance level, which shows that gender did not have a moderating effect on the content of this study.

4.5. Summary of Findings

Building on the technology acceptance model and theory of planned behavior, this study investigated university students' travel app user experience. Findings of the study suggest that both the ease of use and contents of travel mobile apps are positively associated with users' attitude and perceived behavioral control, contributing to their intention to travel. In addition, compared to contents, the ease of use seems to play a more important role in the psychological decision process. The findings of the study have important implications for theory and practice, which are summarized in the section below.

5. Conclusions and Implications

5.1. Theoretical Implications

First of all, we integrated two theoretical frameworks, the technology acceptance model and theory of planned behavior, and studied how experience with travel mobile apps can influence users' attitude, perceived behavioral control, and intention to travel. Although there have been a lot of studies examining each theory separately [57,82–84], not many efforts have been seen to integrate two theoretical frameworks in relation to tourism. Given the growing importance of mobile travel apps in college students' travel decisions and processes, this study integrated these two frameworks in an innovative way. By bringing in the technological features as antecedent variables for the TPB framework, the study helped to extend the traditional TPB model [13]. The study context also offered an ideal setting to test the integration of the two theoretical frameworks, given the important role travel mobile apps play in university students' travel decision making. Therefore, the study contributes to the creative integration of two frameworks, serving as an extension effort for previous theories.

The results show that the ease of use and content perception of mobile travel applications have a positive impact on users' attitude, behavior control, and travel intention. The results also show that the simpler the technical operation of a mobile application is, the more active the user's attitude and perceived behavior control, which is consistent with the research conclusions of Wei and Kong [85], who suggested that the more useful mobile application content is perceived to be by users, the more positive the attitude and behavior control of users are in relation to these mobile applications. At the same time, our study also suggests that attitude and perceived behavior control affect college students' travel intention. Such findings are also consistent with the research conclusions of Hua Chenggang and Bai Changhong [86,87]. In addition, compared with content usefulness, usability has a greater impact on user attitude and perceived behavior control. This suggests that app development needs to put greater weight on the usability and ease of navigation when designing mobile apps.

Second, in-depth analysis of the ease of use of travel apps suggested that travel apps that are easy to learn, easy to understand, easy to operate, have easy human–computer interaction, and easy-to-realize information retrieval are valued most by university student users. In particular, the aspect of human–computer interaction has the highest importance, suggesting that software developers should put more effort into further enhancing this feature in future software designs and upgrades, which differs from Filieri's conclusion that perceived ease of use, online consumer review credibility, and online consumer review usefulness have a positive impact on customer satisfaction [88]. Given that user attitude and perceived behavioral control have mediating roles on the relationships between travel app ease of use and travel app contents, software developers need to make apps as easy and as convenient to use as possible, in addition to providing useful travel-related information, which is consistent with the research conclusions of Ye et al. [89].

Third, different from Zhang's study subjects, this study focused on university students, a population comprising an increasingly important market segment in China's travel

industry [90]. Compared with the general population, the findings of the study suggest that university students are the most active component of the tourism industry. At present, university students are rapidly becoming the most important generational group for the global economy in general and in tourism fields in particular. The findings of the study also provide the unique characteristics of university students, such as being more independent and seeking something new, which are consistent with the research conclusions of Kim and Park [91]. Using smartphones during travel can make travel more efficient, so university students have become the main audience for travel mobile applications.

5.2. Empirical Implications and Recommendations

First, given that their ease of use, travel apps play an important role in users' attitude and perceived behavioral control, which greatly determines their travel intentions; travel app providers need to pay more attention to the design of software. Special attention should be devoted to the ease of use and to making apps as simple, convenient, and easy to use as possible. Travel apps should be designed so that they are convenient for human–computer interaction, easy to operate, easy to understand, have an overall perception of being easy to use, have an easy-to-implement information search, and be easy to learn. This is also determined by the competition in the travel apps market, and software that takes more time to load, learn, and operate will not win consumers' hearts, thus, may not survive. This is particularly true for the younger generation, who grew up with technologies and are less tolerant of apps that do not function well.

Second, perceived usefulness of content also has important impacts on users' attitude, perceived behavioral control, and travel intention. The implication is that the content designers of travel apps should pay attention to the balance of text information and visual information. A well-designed travel app makes it easy to search and find the information users need. In addition, given the interactive nature of today's travel app users, travel app designers should also make it convenient to share content between users or comment on content.

Third, travel apps can also make it possible to mark, categorize, and save certain information to make it easier for users to use and retrieve certain contents. This provides greater ease of use and enhances the overall user experience. The interface of travel apps should also be designed for attractiveness and comfort too. Attention should be devoted to the size of characters, colors, and other aesthetic features of travel apps. In addition, it is necessary to collect the users' travel app usage habit information and identify the content that is most popular among users. Building on users' preferences, travel apps can recommend information and services that might be attractive to users, facilitating travel-related decisions.

Lastly, travel apps should open channels to collect feedback from users directly. No one knows users better than themselves. By opening direct communication channels between users and travel apps designers, designers can understand users' needs and wants more precisely and design the products that best address users' needs. Developers can also use this channel to better understand users' feelings and constantly adjust and update their applications. This feature also makes users feel that they are valued by software providers, and, thus, they will more willingly share their experience for the refinement of travel apps.

6. Limitations and Future Research

As this was a single study with a cross-sectional research design, interpretation of the results and the generalizability of the findings should be approached with caution. Second, the study used the student population, and findings of the study might only be applicable to this particular population. Future research should consider including broader population demographics to enhance the generalizability of the study. Third, the study only included two variables of the TAM model; there might be other variables, such as visual design features and colors, that influence the decision process of users and are worthy of more attention in future research. Lastly, the study focused on future intentions instead of actual

usage behaviors. Intention and behavioral gaps have been observed, and, thus, we suggest future studies include actual behaviors as a dependent variable and assess how travel app performance influences travelers' actual behaviors instead of behavioral intention.

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