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How Does Personality Affect COVID-19 Pandemic Travel Risk Perceptions and Behaviors? Evidence from Segment Analysis in Taiwan

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Abstract: This study aims to assess the risk perceptions and travel intentions of travelers who were segmented into groups based on their personality traits. In total, 684 useful questionnaires were obtained from Taiwan. A multivariate statistical analysis was performed for data analysis. Five clusters of travelers were identified via cluster analysis: sensitive travelers, cogitative travelers, temperate travelers, introverted travelers, and moderate travelers. These clusters exhibited significant differences in the personality traits, risk perceptions, and behavioral intentions of travelers. By introducing strategies for market segmentation that destination managers can use to develop better marketing strategies that target tourist personality traits during pandemic outbreaks, this study potentially contributes to the literature on travel risk, satisfaction, and behavioral intention, and applies marketing strategies from researchers in tourism studies.

Keywords: risk perceptions; travel intentions; personality traits; market segmentation; COVID-19 pandemic

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1. Introduction

Tourism is easily impacted by external environmental variables and internal psychological factors [1,2]. Since the end of 2019, the COVID-19 pandemic has become widespread around the world. With the spread of the COVID-19 pandemic, the tourism industry became concerningly sluggish in both international and domestic tourism markets [2,3]. However, even when facing risks, crises, and disasters, people have sufficient adaptability and resilience in the face of adversity [4,5] to eliminate uncertainties caused by risk, effectively manage risk perceptions, reduce psychological resistance, and take actions to face their difficulties [6]. Accordingly, while the pandemic is slowing down, travel is worthy of further study to determine how to coexist with pandemics and find opportunities for tourism development.

COVID-19 has had a serious impact on the global tourism industry, and most countries have successively adopted their own national tourism strategies [7,8]. The United Nations World Tourism Organization survey pointed out that recovery remains slow and uneven across regions of the world due to restrictions on movement in various countries, differences in vaccination rates and various levels of tourist confidence [9]. When a pandemic occurs, both residents and tourists naturally exhibit health protection perceptions and behaviors [10,11]. With the increase in health risk perceptions, tourism demand has gradually decreased because of the pandemic [1,8]. At this time, if tourists' concerns about health risks can be reduced, their intentions to book a room or travel abroad can be increased [9,11].

Human behavior is affected by personality traits and emotions [12]. Individual risk perception and behavior could be affected by personality traits [10,13]. The pandemic has,

indeed, created an atmosphere of uncertainty and risk. When these risks occur, different personality traits will have different impacts on behavioral intentions, and subjective perceptions of risks will impact travel choices [4].

The tourism industry is vulnerable to global crises. The spread of the COVID-19 pandemic has resulted in people deciding to cancel or postpone their travel plans at the last minute [2]. Providing immediate, honest, empathetic, and informative risk communication could be beneficial to a reduction in subjective doubts and perceptions of risk uncertainty, which would help people take appropriate precautions to enable travel [6,14].

Travel risk perception has been regarded as a hamper to tourists' behavioral intentions [15–17]. Health considerations, the destination risk image [18], risk communication [6], and assurances of cleanliness and social distancing [11] have affected tourist destination preferences during the COVID-19 pandemic. Neuburger and Egger [16] found that demographic variables affect tourists' risk perceptions and future behaviors. However, Razavi [19] suggested that personality traits may be a better predictor of individual behavioral intentions than demographic variables. Individuals in the same demographic group may have different preferences, decision-making processes, and behaviors [20]. Previous studies introduced personality traits as a predictor of individuals' behaviors and attitudes, such as behavioral intentions [21], inclinations toward adventurous behavior [22], attitudes toward climate change [23], environmental behaviors [24], risk perceptions toward genetically modified organisms [25], and travel protection behaviors [10]. During the COVID-19 pandemic, tourists with different personality traits exhibited different strategies while traveling, due to facing a health threat [10,21,26]. To better understand individual personality traits and behavior, previous studies have suggested that segmenting the market by personality traits helps to produce marketing strategies, such as providing personalized services [19] and developing brand identity strategies [27]. However, limited studies have addressed travel risk perceptions and behavioral intentions with regard to personality trait segments during the COVID-19 outbreak. As part of managing the sustainability of a destination, the creation of personality trait-based market segments could result in suitable marketing strategies and provide attractive tourism products, which may assure local economic sustainability and increase destination resilience during turbulent situations.

To fill the above gaps, this study aims to assess the risk perceptions and travel intentions of travelers who were segmented into groups based on their personality traits. By understanding personality traits in more depth, this study will encourage managers to offer suitable services to meet tourists' needs during the ongoing pandemic period.

2. Theoretical Framework

2.1. Personality Traits

Personality traits represent individuals' psychological characteristics, which produce their thoughts, attitudes, affects, and behaviors, as well as enabling the development of interpersonal strategies [28]. Personality traits can affect individuals' internet search behaviors [29], daily spatial behaviors [30], travel intentions during the pandemic [21], generalized anxiety and depressive symptoms [31], environmental protection behavior [32], and adventurous behaviors [22]. Personality traits have been measured by the Big Five model [33], which measures five constructs (i.e., agreeableness, extroversion, conscientiousness, neuroticism, and openness to experience) and is a relatively stable scale [33]. The Big Five model was introduced to explain entrepreneur personality [34–36], the likelihood of household solar energy adoption [24], engagement in environmental behavior [37], investor risk aversion [38], and risk perception [22,39]. Accordingly, the Big Five model would be useful for examining tourists' travel risk perceptions and their subsequent travel intentions.

2.2. Personality Traits and Tourism

In the tourism context, tourists with high levels of openness to experience or neuroticism search for more varied travel information than those with other more prominent personality traits [29]. Leri and Theodoridis [40] indicated that tourists with low neuroti-

cism and high agreeableness, extroversion, conscientiousness, and openness to experience give more attention to the servicescape, emotional stimulation, and revisit intention. Juric et al. [35] found that higher levels of agreeableness and openness to experience positively affect tourists using nonmonetary transactions on Airbnb. In the adventure tourism context, Lee and Tseng [22] indicated that those with high traits of openness to experience and extroversion exhibit more risk-taking attitudes and adventurous behaviors. Recently, travel risk perceptions related to the COVID-19 pandemic have changed tourist travel patterns [21]. Several studies have examined tourist reactions during the COVID-19 pandemic, based on their personality traits; for example, tourists with conscientiousness and neuroticism adopt social distance more often than those with other more prominent personality traits [10]. Zajenkowski et al. [26] also indicated that agreeableness indicates a higher willingness to accept pandemic restrictions. Talwar et al. [41] found that extroverted tourists preferred to travel during the COVID-19 pandemic, while tourists with high openness waited until after the pandemic slowdown. Tepavčević et al. [21] indicated that conscientiousness and neuroticism negatively influence travel intention, while extroversion and openness to experience positively influenced travel intention during the COVID-19 pandemic. Accordingly, tourist personality traits are an important antecedent variable in predicting tourist attitudes and behaviors.

2.3. Risk Perception toward Travel

Risk perception refers to the subjective perception of the uncertainty of things, so scholars employ different dimensions to measure it [42]. Recently, due to the continuous emergence of global pandemics, tourism risk perception has also been intensively debated [11,43]. Assessing risk perceptions, dimensions such as functional risk, physical risk, and facility risk, are usually considered due to the state of the facilities in the destination environment. Psychological risk and privacy risk are considered to result from the psychological feelings of tourists, and financial risk and performance risk are employed to assess cost-effectiveness [42,44–46].

Perceptions of tourism risk influence tourist decision-making, including the choice of attractions and tourism behaviors [4,16–18,47]. Confidence and perceptual choices lead to more responses characterized by psychological resistance [48]. With the number of people dying from coronary pneumonia continuing to increase worldwide, understanding the public perception of risk is increasingly important for tourism development. Previous studies have indicated that reducing the perceived risk can give tourists confidence and increase their willingness to revisit a destination [14]. Increasing the environmental disinfection and open space, reducing crowding in scenic spots, reducing human contact, and using more automated facilities can reduce health concerns and promote the economic development of the tourism industry during the pandemic [14]. Accordingly, during the uncertainty of the COVID-19 pandemic, decreasing people's risk perceptions with effective attention and real-time information can increase their travel intentions [6,14,18].

3. Methods

3.1. Research Instrument

A pretest was conducted between July 31 and August 4, 2021, via an online survey. Overall, 109 valid questionnaires were obtained. The questionnaire was assessed by item analysis, as well as by four tourism experts. The formal questionnaire consisted of three parts: personality traits, risk perceptions, and travel behaviors.

According to the conceptualization and application of personality traits [22], five dimensions were adopted to measure personality traits in this survey: neuroticism (5 items), extraversion (6 items), openness to experience (5 items), agreeableness (5 items), and conscientiousness (5 items). Based on the findings by Kim et al. [44] (2020) and Stone and Grønhaug [49], three dimensions were adopted to assess risk perceptions: physical risk (4 items), financial and benefit risk (6 items), and psychological risk (3 items). Indicators of travel behaviors were adopted from Lee's [50] findings, and three items (i.e., overall

satisfaction, willingness to revisit, and willingness to recommend the site to others) were adopted. The measurement items were changed based on item analysis and feedback from the tourism experts. Minor changes in wording were made to five items to improve readability and comprehensibility. Demographic variables were also recoded. The responses were scored on a Likert scale from completely disagree (1) to completely agree (7).

3.2. Questionnaire Survey

A cross-sectional questionnaire survey was administered to travelers who were visiting a tourist destination. A mixed approach via on-site and online questionnaire surveys was employed to collect the data. Relying on the travel destinations that were accessible and available, a convenience sampling approach was used to collect the data in such open venues. On the other hand, because the COVID-19 pandemic has severely hit the tourism industry and it is known that limiting physical contact is important to reduce the spread of COVID-19, to avoid contact among travelers, a purposive sampling and snow-balling approach was employed to collect the data via an online questionnaire survey. According to previous studies, with a sample error of 5% and a confidence level of 95%, a sample size of at least 385 individuals would be required [22].

The questionnaires were distributed between 16 August 2021, and 27 March 2022. Both online (https://forms.gle/nBtuZZPN8m46PN8g9, accessed on 30 December 2021) and on-site (Sun-Link-Sea Forest Ecological Resort, Sun-Moon-Lake National Scenic Area, Kenting, and Hinoki Village) questionnaire surveys were employed to collect the data. In total, 376 complete answers were obtained from the online survey, and 308 were obtained from the on-site questionnaire for the empirical study.

3.3. Data Analysis

The reliability, descriptive statistics, nonparametric analysis, and clustering and discriminant analyses were performed using IBM SPSS Statistics 26, and convergent validity and discriminant validity were assessed using LISREL 8.80 to analyze the data. The cluster analysis method was performed to quantitatively assess how travelers could be segmented by personality traits. A hierarchical cluster analysis was performed to identify five clusters using the Ward method, by calculating the Euclidean distance between the samples and forming clusters with a minimum within-cluster score [51]. Subsequently, the k-means clustering method was employed with the scores of the five personality traits to form five clusters using all the respondents. A multivariate analysis of variance (MANOVA) was used on the risk perceptions and travel behavior of respondents to assess whether there were significant between-group differences. When the MANOVA analytical results reached a significant level, analysis of variance (ANOVA) was used to assess whether the groups differed with regard to risk perceptions. While significant differences were identified, the Scheffe test was used to identify the differences among the five clusters.

3.4. Reliability and Validity

The Cronbach's alpha for neuroticism, extraversion, openness to experience, agreeableness, conscientiousness, physical risk, financial and benefit risk, and psychological risk were 0.913, 0.901, 0.899, 0.847, 0.906, 0.905, 0.890, and 0.950, respectively. All of these scores were greater than the benchmark of 0.70 [52], indicating that the research instrument has acceptable reliability. Table 1 shows the factor loadings, t-values, composite reliability (CR), and average variance extracted (AVE) for the five personality dimensions and three risk perception dimensions. All the CR scores exceeded 0.6, suggesting that these measures were reliable for the corresponding constructs. All the factor loadings were greater than the 0.5 threshold for the significance level, suggesting acceptable convergent validity. All the AVE scores were greater than the threshold of 0.5, suggesting satisfactory convergent and discriminant validity [53]. Moreover, all of the square roots of the AVEs exceeded the intercorrelations between the pairs of constructs and, thus, illustrated acceptable discriminant validity [53].

Table 1. Factor loading, t-value, average variance extracted (AVE), and composite reliability (CR) of the latent variables for personality traits and risk perception.

Latent Variables	Factor Loading	AVE	CR
Personality traits			
Neuroticism		0.68	0.91
Get stressed out easily	0.88		
Worry about things	0.88		
Fear for the worst	0.79		
Filled with doubts about things	0.75		
Panic easily	0.80		
Extraversion		0.61	0.90
Talk a lot to different people at parties	0.69		
Feel comfortable around people	0.69		
Start conversations	0.81		
Make friends easily	0.85		
Normally the life in a party	0.84		
Know how to captivate people	0.80		
Openness (to experience)		0.65	0.90
Get excited by new ideas	0.78		
Enjoy thinking about things	0.85		
Enjoy hearing new ideas	0.86		
Enjoy looking for a deeper meaning in things	0.84		
Having a vivid imagination	0.68		
Agreeableness		0.54	0.85
Sympathize with others' feeling	0.80		
Concerned about others	0.86		
Respect others	0.76		
Believe that others have good intentions	0.67		
Trust what people say	0.53		
Conscientiousness		0.66	0.91
Carry out my plans	0.73		
Pay attention to details	0.76		
Always prepared	0.87		
Make plans and stick to them	0.89		
Exacting in my work	0.81		
Risk perception			
Physical risk		0.71	0.91
Traveling at this time, I am worried about the risk of catching the COVID-19 pandemic	0.85		
At this time, I try to avoid traveling to popular attractions	0.85		
I don't even want to travel because of the risk of catching the COVID-19 pandemic	0.84		
Because of the current pandemic situation, I prefer to shorten my travel time	0.83		
Financial and benefit risk		0.57	0.88
Traveling at this time will cost more	0.58		
Traveling at this time, I am worried that the quality of tourist attractions does not meet the value	0.74		
Traveling at this time, I am worried that the travel information on the website may be different from the actual one	0.79		
Traveling at this time, I am worried that the quality of accommodation or food hygiene during the tour is not as good as expected	0.86		
Traveling at this time, I am worried about the inconvenience of transportation	0.72		
Traveling at this time, I am worried about the inconvenience of food and accommodation	0.79		
Psychological risk		0.84	0.94
Traveling at this time makes me feel uncomfortable	0.94		
Traveling at this time makes me feel anxious	0.91		
Traveling at this time makes me nervous	0.89		

All the t-value of factor loadings larger than 1.96; AVE: Average variance extracted = $(\Sigma\lambda^2)/[\Sigma\lambda^2 + \Sigma(\theta)]$; CR: Composite reliability = $(\Sigma\lambda)^2/[(\Sigma\lambda)^2 + \Sigma(\theta)]$.

4. Results

4.1. Profiles of the Respondents

In summary, most respondents were female (56.4%), had a single marital status (52.8%), were between the ages of 20 and 39 (64.0%), were highly educated with university or college

degrees (59.3%), had an occupation as a business person (23.4%) or laborer (22.8%), had a monthly income between TWD 20,001 and 40,000 (34.7%) or TWD 40,001–60,000 (26.1%), and lived in Yunlin, Chiayi, Tainan (33.3%) and Taipei, New Taipei City, Ilan (24.7%; Table 2).

Table 2. Profiles of the respondents.

Variable		N	%
Gender			
	Male	295	43.1
	Female	386	56.4
	Other	3	0.4
Marital status			
	Single	361	52.8
	Married	323	47.2
Age (years old)			
	20–29 years old	507	38.8
	30–39 years old	329	25.2
	40–49 years old	255	19.5
	50–59 years old	161	12.3
	Over 60 years old	54	4.1
Educational level			
	Junior high school and below	23	1.8
	High school	269	20.6
	University or college	775	59.3
	Graduate school	240	18.4
Occupation			
	Office worker or teacher	226	17.5
	Agriculturist, farmer, or fisherman	21	1.6
	Laborer	294	22.8
	Business person	301	23.4
	Housewife	62	4.8
	Retire or none	44	3.4
	Student	192	14.9
	Others	149	11.6
Monthly income (TWD *)			
	≤20,000	223	17.4
	20,001–40,000	444	34.7
	40,001–60,000	333	26.1
	60,001–80,000	152	11.9
	80,001–100,000	52	4.1
	≥100,001	74	5.8
Residence			
	Taipei, New Taipei City, Ilan	169	24.7
	Taoyuan, Hsinchu, Miaoli	51	7.5
	Taichung, Chunghwa, Nantou	138	20.2
	Yunlin, Chiayi, Tainan	228	33.3
	Kaohsiung, Pingtung	79	11.5
	Hualien, Taitung	12	1.8
	Ponghu, Chinmen, Matsu	7	1.0

* 1 US$ =31.13 NT$ as of 20 November 2022.

4.2. Market Segmentation of the Travelers

Since the shift from six to five groups resulted in the largest percentage increase in the error coefficient, five clusters were optimally determined from the hierarchical cluster analysis. Next, five clusters were generated for all respondents by using the k-means clustering method based on the scores of the personality traits. Cluster 1 included 17.58% (n = 119) of the respondents. This group had the highest scores for neuroticism and was named as the sensitive travelers. Cluster 2 consisted of 16.69% (n = 113) of the respondents. This group had the highest scores for openness, agreeableness, and conscientiousness, and was named as the cogitative travelers. Cluster 3 accounted for 26.00% (n = 176) of

the respondents. This group had high scores for extraversion, openness, agreeableness, and conscientiousness, along with neuroticism, and was named as the temperate travelers. Cluster 4 consisted of 12.85% (n = 87) of the respondents. This group had relatively low scores for openness to experience, agreeableness, and conscientiousness, and was named as the introverted travelers. Cluster 5 accounted for 26.88% (n = 182) of the respondents. This cluster had a middle range for the five personality traits and was named as the moderate travelers.

The assessment of the cluster formation procedure indicated that 96.9% of the original grouped cases and 96.2% of the cross-validated grouped cases were correctly classified, indicating a relatively high accuracy rate. Sensitive travelers (97.5%), cogitative travelers (98.2%), temperate travelers (96.0%), introverted travelers (95.4%), and moderate travelers (97.3%) were correctly classified into their respective clusters. Consequently, the five groups indicated that the discriminant function was effectively identified.

The discriminant analysis revealed four significant canonical discriminant functions ($p < 0.001$; Table 3). These analytical results suggested that the relationships among the functions and the dependent variables were effectively explained by the models (54.0%, 42.5%, 3.3%, and 0.2%, respectively). All the personality traits were assessed to be statistically significant based on Wilks's lambda tests, showing that all the personality traits contributed significantly to the discriminant function.

Table 3. Summary of discriminant analysis results.

Function	Eigenvalue	Variance Explained	Canonical	Wilks'	χ^2	df	*p*
		by Function (%)	Correlation	Lambda			
1	2.777	54.0	0.857	0.07	1780.506	20	<0.001
2	2.183	42.5	0.828	0.266	888.858	12	<0.001
3	0.172	3.3	0.383	0.846	111.958	6	<0.001
4	0.008	0.2	0.091	0.992	6.637	2	<0.05
Discriminant loading		Function 1	Function 2	Function 3	Function 4		
Sensitive travelers		−0.246	0.971	−0.071	0.014		
Cogitative travelers		0.612	0.062	−0.71	0.156		
Temperate travelers		0.453	0.040	0.019	−0.316		
Introverted travelers		0.316	0.137	0.404	−0.589		
Moderate travelers		0.383	0.159	0.431	0.826		

96.9% of original grouped cases correctly classified;96.2% of cross-validated grouped cases correctly classified.

4.3. Personality Trait Differences among the Five Clusters

One-way ANOVA and Scheffe's post-hoc tests in personality traits among five clusters showed that the personality traits differed significantly among the five clusters ($p < 0.001$; Table 4), confirming the identification of distinct personality trait clusters. The mean of the sensitive travelers was statistically higher in the measures of neuroticism than the other four groups ($p < 0.001$). Cogitative travelers were significantly higher in conscientiousness than other clusters ($p < 0.001$) and significantly lower in neuroticism than other clusters ($p < 0.001$). Temperate travelers scored significantly higher in neuroticism, agreeableness, and conscientiousness than sensitive travelers, introverted travelers, and moderate travelers ($p < 0.001$). Introverted travelers scored significantly lower in openness to experience, agreeableness, and conscientiousness than sensitive travelers, cogitative travelers, temperate travelers, and moderate travelers ($p < 0.001$). Moderate travelers had relatively moderate scores in all five personality traits.

Table 4. Results of one-way ANOVA in personality traits among five clusters.

Personality Trait	Cluster	Mean ± SE	F-Value	*p*	Post-Hoc Test
Neuroticism					
	a. Sensitive travelers (n = 119)	5.71 ± 0.07	364.59	0.000	a > c > d > e > b
	b. Cogitative travelers (n = 113)	2.27 ± 0.07			
	c. Temperate travelers (n = 176)	5.17 ± 0.06			
	d. Introverted travelers (n = 87)	3.14 ± 0.12			
	e. Moderate travelers (n = 182)	3.54 ± 0.06			
Extraversion			178.84	0.000	c, b > e > a, d
	a. Sensitive travelers (n = 119)	3.03 ± 0.08			
	b. Cogitative travelers (n = 113)	5.04 ± 0.09			
	c. Temperate travelers (n = 176)	5.07 ± 0.06			
	d. Introverted travelers (n = 87)	2.91 ± 0.11			
	e. Moderate travelers (n = 182)	3.52 ± 0.06			
Openness to experience			168.72	0.000	b, c > e > a > d
	a. Sensitive travelers (n = 119)	4.58 ± 0.10			
	b. Cogitative travelers (n = 113)	6.04 ± 0.06			
	c. Temperate travelers (n = 176)	5.90 ± 0.05			
	d. Introverted travelers (n = 87)	3.54 ± 0.09			
	e. Moderate travelers (n = 182)	4.96 ± 0.06			
Agreeableness			124.29	0.000	b,c > e, a > d
	a. Sensitive travelers (n = 119)	5.16 ± 0.08			
	b. Cogitative travelers (n = 113)	6.02 ± 0.06			
	c. Temperate travelers (n = 176)	5.87 ± 0.05			
	d. Introverted travelers (n = 87)	4.00 ± 0.10			
	e. Moderate travelers (n = 182)	5.38 ± 0.04			
Conscientiousness			114.67	0.000	b > c > e, a > d
	a. Sensitive travelers (n = 119)	4.90 ± 0.11			
	b. Cogitative travelers (n = 113)	5.99 ± 0.07			
	c. Temperate travelers (n = 176)	5.56 ± 0.07			
	d. Introverted travelers (n = 87)	3.39 ± 0.09			
	e. Moderate travelers (n = 182)	4.96 ± 0.06			

4.4. Risk Perceptions and Travel Behavior Differences among the Five Clusters

Table 5 compares the risk perceptions (i.e., physical risk, financial and benefit risk, and psychological risk) and travel behaviors (i.e., overall satisfaction, willingness to revisit, and recommendation of the sites to others) of the five groups. Temperate travelers had the highest scores for physical risk, financial and benefit risk, and psychological risk, while introverted travelers had the lowest scores. Cogitative travelers had a significantly greater overall satisfaction than sensitive travelers and introvert travelers. Sensitive travelers were significantly less willing to travel than the other travelers. Cogitative travelers and temperate travelers were significantly more willing to recommend the site to others than sensitive travelers, introverted travelers, and moderate travelers.

Table 5. Comparisons for risk perceptions and travel behaviors of five groups by one-way ANOVAs.

Satisfaction/	Cluster	Mean ± SE	F-Value	*p*	Bonferroni Test
Behavioral Intention					
Physical risk					
	a. Sensitive travelers	5.30 ± 0.14	15.15	0.000	c > a, b, e > d
	b. Cogitative travelers	5.30 ± 0.13			
	c. Temperate travelers	5.84 ± 0.09			
	d. Introverted travelers	4.55 ± 0.16			
	e. Moderate travelers	5.07 ± 0.09			

Table 5. *Cont.*

Satisfaction/	Cluster	Mean ± SE	F-Value	*p*	Bonferroni Test
Financial and benefit risk			10.98	0.000	c, a, b, e > d
	a. Sensitive travelers	4.85 ± 0.12			
	b. Cogitative travelers	4.59 ± 0.13			
	c. Temperate travelers	5.04 ± 0.10			
	d. Introverted travelers	4.01 ± 0.15			
	e. Moderate travelers	4.42 ± 0.09			
Psychological risk			12.69	0.000	c, a > b, d, e
	a. Sensitive travelers	4.79 ± 0.15			
	b. Cogitative travelers	4.05 ± 0.16			
	c. Temperate travelers	4.89 ± 0.13			
	d. Introverted travelers	3.66 ± 0.17			
	e. Moderate travelers	4.03 ± 0.12			
Overall satisfaction			2.71	0.029	b, c > d, e > a
	a. Sensitive travelers	4.26 ± 0.16			
	b. Cogitative travelers	4.94 ± 0.17			
	c. Temperate travelers	4.70 ± 0.13			
	d. Introverted travelers	4.41 ± 0.17			
	e. Moderate travelers	4.54 ± 0.13			
Willingness to revisit			3.38	0.012	b, c, e, d > a
	a. Sensitive travelers	4.21 ± 0.17			
	b. Cogitative travelers	4.97 ± 0.18			
	c. Temperate travelers	4.77 ± 0.14			
	d. Introverted travelers	4.45 ± 0.18			
	e. Moderate travelers	4.60 ± 0.12			
Willingness to recommend the site to others			2.55	0.038	b, c > a, d, e
	a. Sensitive travelers	4.33 ± 0.17			
	b. Cogitative travelers	4.98 ± 0.18			
	c. Temperate travelers	4.76 ± 0.14			
	d. Introverted travelers	4.47 ± 0.18			
	e. Moderate travelers	4.52 ± 0.13			

5. Discussion

5.1. Theoretical Implications

Scholars have suggested that travel risk negatively influences tourism satisfaction [54] and travel intention [17,21,55] during periods of health threat. Moreover, research on COVID-19 has explored the factors influencing travel behavior and intention, such as risk perceptions [11,16,47], travel attitudes [17], risk image [18], and personality traits [21,41]. Tepavčević et al. [21] indicated that individuals' travel anxiety, fears of the pandemic, and behavioral intentions during the COVID-19 period may vary with their personality traits. Several studies have used segmentation by personality traits to understand phenomena, such as mobile usage patterns [19] and fashion consciousness in Generation Y [27]. Previous studies have segmented tourists by actual travel behaviors [56], travel risk perceptions [16,55,57], and risk attitudes [58]. However, no study has deeply explored individual differences by segmenting tourist personality traits and has further identified the attributes of travel risk, satisfaction, and travel intention by marketing segmentation. By introducing strategies for marketing segmentation through tourist personality traits for destination managers to develop more effective marketing strategies during outbreaks, this study potentially contributes to the literature and applies the use of marketing strategies by researchers in tourism studies.

The empirical results Indicated that sensitive travelers perceived risk at greater frequencies, but had the least satisfaction and travel intention, which is consistent with the findings of Tepavčević et al. [21] and Aumeboonsuke and Caplanova [38]. In outbreaks, neurotic tourists have more fears of the pandemic and are not willing to travel [21]. Moreover, Aumeboonsuke and Caplanova [38] reported that neurotic tourists have more risk aversion than people with other more prominent personality traits, which is consistent

with the behavioral intentions of sensitive travelers. This study also confirms that sensitive travelers have high risk perceptions of physical, financial, and beneficial factors, in addition to high psychological risks; they have the least satisfaction and lowest travel intention during outbreaks in these five segments, which contributes to the literature.

Cogitative travelers perceive fewer risks than sensitive travelers and temperate travelers, but represent the highest levels of satisfaction and behavioral intention. Bujisic et al. [59] found that people with a high trait of openness to experience have more satisfaction and destination loyalty than those with the other four personality traits because they immerse themselves into activities easily. Khoi et al. [60] argued that openness to experience encourages people to seek novel and inspirational activities, which fosters their satisfaction and loyalty. Leri and Theodoridis [40] also found that people with low neuroticism perceive the servicescape more acutely and have higher intentions to revisit. This study confirms that cogitative travelers had the highest satisfaction and behavioral intentions during the pandemic, which expands our knowledge of tourism during the COVID-19 pandemic.

The empirical results suggest that the temperate traveler group perceives the most risks of all the groups, which is consistent with the results of Jani et al. [29] and Siegrist et al. [61]; this indicates that travelers in this group are likely to search for more information and have more knowledge that leads them to perceive risks while traveling. With more knowledge, tourists can try their best to prevent risks and enjoy their trips, which led to higher satisfaction and loyalty during the pandemic. The results indicated that the levels of pandemic risk perception, satisfaction and behavioral intention of the temperate group seem to be the same as those of satisfaction with tourism development among residents [62] and the levels of behaviors associated with internet searches by tourists [29].

Introverted travelers have extremely different risk perceptions, satisfaction, and willingness to recommend the site to others from those of temperate travelers. Meanwhile, the moderate traveler group had moderate risk perceptions, satisfaction, and behavioral intentions among these five groups. This study identifies different personality trait segments and demonstrates that each segment had different risk perceptions, satisfaction levels, and travel intentions during the pandemic. Accordingly, this study fills research gaps and extends our knowledge of personality traits, risk perception, satisfaction, and travel intention during the pandemic.

5.2. Managerial Implications

According to Razavi's [19] study, segmenting by personality traits provides a better understanding of tourists' behavioral intentions than segmenting by demographic variables. Tourism managers should develop marketing strategies and provide suitable products and services based on these five segments to attract potential tourists during pandemic periods. Temperate travelers attach great importance to safety while traveling. Jani et al. [29] suggested that people with high extraversion and neuroticism traits search for pandemic information before traveling. Accordingly, destination managers need to convince them that destinations are safe by providing pandemic prevention measures on websites or social media. Moreover, managers should ensure that the facilities and the environment in the destination are sterilized periodically, or provide noncontact services to create safe places for tourists [63,64].

With high risk perception but low satisfaction, willingness to revisit, and willingness to recommend the site to others, sensitive travelers were found to worry too much and not be satisfied from the trip. Providing low-risk travel activities and environments is, therefore, suggested to allow sensitive travelers to increase their overall satisfaction and behavioral intentions in favor of the low-risk travel patterns in the COVID-19 pandemic period. With high neuroticism attributes, sensitive travelers may avoid interacting with people [35]; thus, tourism managers may provide outdoor recreation activities for single travelers, such as hiking and sightseeing, to reduce their risk perception and increase their satisfaction and recommendations.

Cogitative travelers have the highest ratings for satisfaction, willingness to revisit, and willingness to recommend the site to others; thus, managers should focus on this market segment. As this group has a high rating for travel risk perception, the destination managers should ensure that pandemic prevention measures are implemented precisely to reduce their risk perceptions. Moreover, managers can demonstrate the beauty of the destination and promote strategies (such as coupons for food, beverages, or accommodations) to attract cognitive travelers and raise their satisfaction. Based on the highest recommendation among these five segments, provoking bonuses to cogitative travelers for posting their destination pictures or messages on social media to allure other tourists can help managers promote their destination and ensure more tourists visits [29]. As individuals with high openness to experience, cogitative travelers are likely to search for information about the destination before traveling [29]. Tourism managers should update information on the destination homepage and social media, as well as demonstrate that pandemic prevention measures have been strictly implemented to convince these two segments of travelers. Moreover, marketers should provide interaction activities to meet the personality traits of various travelers, such as experiencing natural or cultural resources. Specifically, compared to temperate travelers, cognitive travelers have lower ratings of neuroticism and are likely to share posts on social media [65]; thus, tourism managers may encourage them to post images and messages, or check in on social media to promote the destination.

Moderate travelers represent the largest proportion of travelers. With mid-level ratings for risk perception and satisfaction, behavioral intention, and recommendation in these five segments, managers need to strengthen information on websites and social media, such as by emphasizing the beauty of destinations, offering assurance of sanitary environments, and offering rebates for services; this may relieve travelers' anxiety and raise satisfaction, loyalty, and pro-environmental behavior, ultimately achieving sustainable tourism [63,66,67]. Moreover, tourism marketers may offer all sorts of activities, well-designed services, and pandemic prevention environments to increase visitors' satisfaction, behavioral intentions, and positive word-of-mouth.

Introverted travelers have the lowest rating of the Big Five traits, risk perceptions, satisfaction, behavior intentions, and recommendation intentions, as they may not be motivated to contact other people. Tourism managers may provide self-guided interpretation services and noncontact services for these tourists to increase their satisfaction, willingness to revisit, and willingness to recommend the site to others, thereby increasing their pro-environmental behavior [68–70]. In addition, tourism managers should remind introverted travelers to obey pandemic prevention measures using placards to prevent pandemic outbreaks.

Accordingly, facing a competitive environment, destination managers should develop their own differentiated products, target consumer groups, build brand images, and introduce differentiated marketing strategies to establish competitive advantages during the pandemic [71].

5.3. Limitations and Future Research

Despite the potential contribution, several research limitations should be acknowledged for future study directions. First, given the cross-sectional nature of this study, the present study failed to elucidate market segmentation for longer periods of time and might not be reflected in longitudinal travel segmentation [72]. To overcome this issue, a multiyear survey is needed.

Second, scholars claim that the Big Five are less reliable in non-WEIRD (i.e., Western, Educated, Industrialized, Rich, and Developed) countries [73]. The present study employed the Big Five to assess the personality traits that could affect the findings, but other personality traits should be investigated [73]. Accordingly, future work is recommended to re-examine segmentation marketing using measures of the Big Five personality traits and other personality traits from an international perspective by collecting multicultural and international data.

Third, although behavioral intentions are crucial for the attitudinal perspective, they seem to be poor predictors of actual behaviors [74,75]. To resolve this issue, further studies should employ qualitative approaches, such as direct behavioral observation, participant observation or implicit measurement techniques, to elucidate the actual behaviors of travelers [76].

Finally, an a priori assumption was made that respondents had thought about their behavioral intentions to travel, revisit, and recommend when conducting this study. However, respondents may not consider these intentions, leading to the survey forcing the respondents to express an opinion to complete the survey; thus, self-generated validity effect seems to be an issue [77,78]. To reduce this effect, adopting a counterbalancing question order with the survey questions arranged non-sequentially is recommended [79].

6. Conclusions

Although the market segmentation, travel risk perceptions, satisfaction, and behavior of travelers have been intensively elucidated and discussed in past research, limited previous studies have clarified the market segmentation of travelers based on their personality traits during the COVID-19 pandemic. This study first identified five market segments of travelers, assessed their personality traits, travel risk perceptions, satisfaction, and behaviors, and subsequently elucidated the differences in their travel risk perceptions, satisfactions and behavioral intentions, filling research gaps and contributing to the literature.

Understanding market segments can inform marketing efforts to target prospective travelers, assist tourist destination businesses in developing sustainability management and provide a competitive edge to managers by providing viable marketing strategies [80]. This study's findings elucidate five segments (i.e., sensitive travelers, cogitative travelers, temperate travelers, introverted travelers, and moderate travelers) that are deeply discussed within relevant theoretical frameworks, regarding individual differences by personality traits, travel risk, satisfaction, and behavioral intentions, providing valuable insights for the literature on tourism management.

Market segmentation allows tourism destinations to focus their resources to meet the needs of target travelers more effectively. This study's findings provide an effective tool for market segmentation to create differentiated marketing strategies for segments, and improve customer relationship management. Understanding potential target travelers and formulating differentiated marketing strategies for different travelers can lead to competitive advantages.

By proposing diverse marketing strategies in light of these findings, this study sheds light on previously reported but unexamined market segments among travelers during the COVID-19 pandemic. This study's market segmentation elucidates the reasons for travel and behavioral intentions, and ultimately leads to sustainable tourism.

Finally, we conclude that travelers (i.e., sensitive travelers, cogitative travelers, temperate travelers, introverted travelers, and moderate travelers) with different personality traits have different risk perceptions and travel behaviors. By providing information for differentiated marketing, the tourism industry can effectively develop diverse marketing strategies that target specific traveler segments to satisfy them; this can subsequently increase behavioral intentions. Therefore, this study extends knowledge on the travel destination market during the pandemic and significantly contributes to the literature.

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