Validation of an Operationalized Model of Iso-Ahola's Theory of Tourism Motivation: A Case in Point-to-Point Suborbital Space Travel

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Scholarly Commons Citation

Introduction

The word *space tourism* was first used in 1965 in reference to the public having an opportunity to experience the joy of space flight using military and civil space technology (Rogers, 2001). Since then, seven space tourists have experienced space flight to the International Space Station. The major market for space tourism, though, is suborbital space tourism. The demand for suborbital space tourism is challenging to predict because research focuses on different demographics of potential suborbital space flight tourists. Estimates range from 335 to 58,340 suborbital space tourists per year within 12 years of the first suborbital space flight carrying space tourists (Musselman & Hampton, 2020). Suborbital space tourism is the catalyst to transform the space industry from $340 billion a year to over $1 trillion a year over the next 20 years (Berrisford, 2018; Chang, 2015; Chang, 2020). These estimates reflect suborbital space flight where the space tourist is launched to an altitude higher than 100 km (62 miles) [Karman Line], spends approximately 5 minutes in microgravity, and returns to a location on earth relatively close to the launch location.

This form of suborbital space tourism became reality as Virgin Galactic and Blue Origin launched the first suborbital space flights with passengers in July 2021 (Foust, 2021a, 2021b). The next phase of suborbital space tourism is point-to-point suborbital space tourism where a space vehicle flies above the Karman Line, but travels from one point on earth to another point of considerable distance or circumnavigates the earth. The point-to-point suborbital space tourism market is predicted to be a $20 billion a year market providing motivation for the space industry (Johnson & Martin, 2016; Sheetz, 2019). However, it is the adventure, novelty, and prestige of suborbital space flight which motivates potential point-to-point suborbital space tourists (Ao, 2018; Baugh et al., 2018; Chang, 2017; Olya & Han, 2020; Reddy et al., 2012).

Although the literature supports adventure, novelty, and prestige as the motivation for point-to-point suborbital space tourism, the authors did not discover any previous research assessing point-to-point suborbital space flight within the theoretical foundation of the theory of tourism motivation. The objective of this study is to validate the theory of tourism motivation for use in point-to-point suborbital space tourism research. The study provides participants with a point-to-point suborbital space tourism scenario and asks them to complete a survey based on the theory of tourism motivation. Exploratory and confirmatory factor analyses were used to test the measured items of the survey to see how well they represent the latent constructs (four dimensions) of the theory of tourism motivation.

Literature Review

Tourism motivation emerged from a transition of motivation research from academia to industry. Tourism motivation, like other motivation theories, is based on psychology, sociology, and anthropology (Fullerton, 2013; Thanabordeekj & Nipasuwan, 2017). However, tourism motivation theories sought to understand what drives tourists to travel as people's travel choices begin with motivation. Several motivation theories were developed to provide the basis for understanding tourists' motivation (Beard & Ragheb, 1983; Crompton, 1979; Dann, 1977; Iso-Ahola, 1982; Khuong & Ha, 2014; Kim et al., 2006; Pearce & Caltabiano, 1983; Yousaf et al., 2018).

The push-pull theory emerged as the most prominent theory of tourism motivation (Klenosky, 2002). Push factors are forerunners to pull factors and provide the initial drive to travel. Push factors explain the motives for travel and are internal and distinctive to the traveler. Pull factors explain what draws a person to a specific travel location or event. Therefore, pull factors are external to the traveler, and explain the choice of a specific tourism location or event

(Crompton, 1979; Dann, 1977; Jamrozy & Uysal, 1994; Klenosky, 2002; Yousefi & Marzuki, 2015). Dann (1977) and Crompton (1979) provided foundational definitions of push factors. On one end of a spectrum, push factors can be a desire to get away, to escape from life and work environment, to relax, to improve relationships with family/friends, and enable social interactions. On the other end of a spectrum, push factors can be prestige, enhancement of one's ego, and personal assessment. Multiple research studies have used the push-pull theory as the theoretical foundation, however, the research identified specific push factors associated with the traveler or destination, but not to tourism motivation in general (Fodness, 1994). Studies assess travel to particular locations (Correia et al., 2007; Hanquin & Lam, 1999; Yousefi & Marzuki, 2015), exhilarating events, such as rock-climbing, (Albayrak & Caber, 2018; Caber & Albayrak, 2016; Whyte, 2017), or specific demographic groups (Chen & Chen, 2015; Prayag, 2012; Rita et al., 2019). None of the previous studies on space tourism motivation used the push-pull theory as their grounded theory. However, they did essentially identify adventure, novelty, and prestige as push factors for space tourism motivation (Ao, 2018; Baugh et al., 2018; Chang, 2017; Olya & Han, 2020; Reddy et al., 2012). This research was valid and reliable but does not provide a universal framework for tourism motivation.

With the push-pull theory as the foundation, Iso-Ahola (1982) developed the theory of tourism motivation. The theory of tourism motivation separates the push factors into one of four dimensions. The dimensions are assigned based on a horizontal dialectic of escape and seeking, and a vertical dialectic of personal and interpersonal. These four factors segment the spectrum of push factors defined in the push-pull theory. Personal escape is fleeing personal stresses and challenges. Personal seeking is looking for revitalization, prestige, and enhancement of one's ego. Interpersonal escape is fleeing the stresses and challenges of family, friends, and work

colleagues. Interpersonal seeking is pursuing interaction with natives of a location or a group of tourists.

Snepenger et al. (2006) operationalized Iso-Ahola's (1982) theory of tourism motivation. They developed a survey with three items per each of the four dimensions of Iso-Ahola's theory. Confirmatory factor analysis demonstrated factor loading of each of the items for each dimension of the theory of tourism motivation. Six different structural equation models were compared to identify the model with the best fit. The model with each of the four dimensions as a separate first order construct was the model with the best fit. Two separate research studies mirroring Snepenger et al.'s (2006) research provided similar results. The model with the four dimensions as separate first order constructs was also the best fitting model (Biswas 2008; Thanabordeekj & Nipasuwan, 2017).

Current Study

Snepenger et al.'s (2006) model provides a universal framework to assess tourism motivation, however, previous research did not evaluate this model of the four dimensions of theory of tourism motivation as it applies to space tourism. We know of no study using point-to-point suborbital space tourism as a scenario to measure tourism motivation with Snepenger et al.'s (2006) model. The purpose of this study was to validate Snepenger et al.'s (2006) model of the theory of tourism motivation for use in point-to-point suborbital space tourism research. This study focused on examining the measurement model of these dimensions allowing future research to predict external criterion of space tourism related factors.

Methodology

Design, Data Analysis, and Ethics

The study used a quantitative methodology, and a non-experimental, cross-sectional survey design. Data analysis was conducted using exploratory factor analysis (EFA) and confirmatory factor analysis (CFA). All researchers' Collaborative Institute Training Initiative (CITI) certifications on the proper treatment of human participants were current at the time of the study.

Initial Model Assessment

Participants

Four hundred and thirty-two participants from the United States responded to the survey from Amazon's ® Mechanical Turk ® (MTurk) posted on December 1, 2020. To ensure quality participants, the researchers established minimum participant eligibility requirements for survey participants, which included that participants had to have a human intelligence task (HIT) approval rating greater than 98% and the number of HITs approved had to be greater than 100. Participants were presented with the following statement before choosing to participate in the survey: "We are conducting an academic survey about aviation and space. We need to understand your opinion." MTurk provides access to participants who are diverse across education, demographic, and dispositional variables (Mason & Suri, 2012; Mehta et al., 2019; Sheehan, 2018), and the ability to acquire many samples with results similar to laboratory or offline studies (Buhrmester et al., 2011; Germine et al., 2012; Mason & Suri, 2012). MTurk has previously been used for various aviation-related studies including urban air mobility vehicles (Rice & Winter, 2020; Rice et al., 2017; Ward, 2020). Respondents not from the United States were excluded from the data because this study focused on participants who reside in the United

States. One case with incomplete data was identified during initial data screening. This case could not be resolved with an imputation method. Thirteen cases were removed due to the participant not being engaged as they provided the same response for every item. There was one outlier for age as the participant did not report any age. The participant's age was replaced with average age for all participants. After data screening, 418 cases (236 males, 180 females, and 2 no response) were assessed as valid for data analysis. The participants, on average, were 38.04 (*SD=11.62*) years old. Gender and Ethnicity are summarized in Table 1.

Table 1

Summary of Gender and Ethnicity: Initial Model Assessment

Characteristics	Subcategories	Frequency (*n*)	Percentage (%)
Gender	Male	236	56.4
	Female	180	43.0
	Nonbinary	0	0.0
	No Response	2	0.5
Ethnicity	Caucasian	310	74.1
	African descent	24	5.7
	Hispanic descent	25	5.9
	Asian descent	54	12.9
	Other	5	1.2
	No Response	0	0.0

Material and Stimuli

A digital consent form was presented to participants. In order to proceed to the survey, they had to agree to the consent form. Following consent, participants were provided brief instructions, and a short definition of space tourism. Then the participants were provided with the following scenario with a map depicting the flight path: "*You will receive one day of pre-launch*

training the day before your flight. On the day of launch from Spaceport America in Las Cruces, NM, you will board the suborbital space vehicle. Your suborbital space flight travels around the globe flying over the midwestern United States and past the Great Lakes. The flight proceeds over southern Greenland, Ireland, England, France, Italy, Greece, Israel, Jordan and Saudi Arabia. The flight proceeds between Antarctica and Australia, and over the South Pacific before landing back at Spaceport America." Participants then indicated their level of disagreement or agreement using a 5-point Likert scale on 12 statements adapted from Snepenger et al.'s (2006) model of the theory tourism motivation (see Appendix). Before data collection, Institutional Review Board (IRB) approval was granted by Embry-Riddle Aeronautical University (IRB approval number 21-042).

Results

The purpose of the initial model assessment was to see if the items and latent variables as published by Snepenger et al. (2006) would be valid within a point-to-point suborbital space tourism scenario. Exploratory factor analysis (EFA) was conducted, using maximum likelihood and Promax rotation, to determine the correlation among the observed variables, and validate the factor structure. Promax is an appropriate method for this type of research as it assumes the factors are not correlated but relaxes the rotation to allow the factors to correlate (Byrne, 2016). IBM® SPSS ® 27 was used for EFA. Skewness and Kurtosis values were used to identify the normality of the data. All indicators of latent factors exhibited normal distributions of skewness and kurtosis with the highest values reported for item 2 with a skewness of -1.25 and kurtosis of 2.88 (Sposito et al., 1983). Next, Kaiser-Meyer-Olkin (KMO) value was assessed for measure of sampling adequacy (MSA). Hair et al. (2018) report a KMO of 0.50 as adequate to proceed with data analysis. A value of 0.70 is considered middling, and a value of 0.80 is considered

meritorious. A KMO value of 0.825 was reported for this initial EFA. A statistically significant result indicates adequate correlation among the variables to run an EFA (Hair et al., 2018). The reported Bartlett's test of sphericity significance of $p < 0.001$ was acceptable, indicating the variables relate to one another well enough to run a meaningful EFA (Gaskin, 2022).

The initial EFA failed to produce data fitting to the prescribed four latent variables (dimensions) as listed in Table 2. Only three factors were detected (not four), and multiple items cross-loaded onto multiple factors. Therefore, the researchers modified the item descriptions and added one item per latent variable based on an aggregate of research related to tourism motivation (Crompton, 1979; Dann, 1977; Iso-Ahola, 1982; Klenosky, 2002; Pearce & Caltabiano, 1983; Pearce & Lee, 2005). The items were modified to ensure common terminology (e.g., each statement begins with "I" followed by a verb). Snepenger et al. (2006) used a fourth item in the original research as reflected in the model comparisons, however, did not report the description of the fourth item. Therefore, to re-validate Snepenger et al.'s (2006) model, the researchers found it prudent to add a fourth item. The 16 modified items were used in the assessment of the re-specified model and are shown in the Appendix.

Table 2

Pattern Matrix[a]: Initial Model Assessment

Item	Factor 1	Factor 2	Factor 3
Item1	-	-	0.669
Item2	-	-	0.573
Item3	0.638	-	-
Item4	0.869	-	-
Item5	0.734	-	-
Item6	0.805	-	-
Item7	-	0.348	0.342
Item8	-	0.308	0.369
Item9	-	-	0.574
Item10	-	0.770	-
Item11	-	0.656	-
Item12	-	0.809	-

Note. Extraction method: Maximum likelihood. Rotation method: Promax with Kaiser normalization.

[a]Rotation converged in 5 iterations.

Re-Specified Model Assessment

The process to recruit participants was the same for the re-specified model assessment as used for the initial model assessment. However, for the re-specified model, the participants indicated their level of disagreement or agreement on the 16 modified items adapted from Snepenger et al.'s (2006) model of tourism motivation.

Participants

Five hundred and seven participants from the United States responded to the survey posted on MTurk on January 23, 2021. Respondents to the initial model assessment were restricted from responding to the re-specification assessment. Known value replacement was used to impute missing values on reflective items (Hair et al., 2018). Known value replacement

relies on the researcher imputing values for reflective scale items given responses to the surrounding items on the scale. Thirty-three cases were removed due to the participants not being engaged as they provided the same response for every item. There was no outlier for age. After data screening, 474 cases (237 males, 231 females, 2 nonbinaries, and 4 no response) were assessed as valid for data analysis. The participants, on average, were 40.34 ($SD = 13.09$) years old. Gender and Ethnicity are summarized in Table 3.

Table 3

Summary of Gender and Ethnicity: Re-specified Model Assessment

Characteristics	Subcategories	Frequency (n)	Percentage (%)
Gender	Male	237	50.0
	Female	231	48.7
	Nonbinary	2	0.4
	No Response	4	0.8
Ethnicity	Caucasian	378	79.7
	African descent	19	4.0
	Hispanic descent	21	4.4
	Asian descent	53	11.2
	Other	1	0.2
	No Response	2	0.4

Materials and Stimuli

The process and procedure for participants in the re-specification assessment was the same as described in the initial model assessment, with the exception that participants in the re-specified analysis responded to the modified items.

Results

Exploratory Factor Analysis (EFA) was conducted, using maximum likelihood and Promax rotation, to determine the correlation among the observed variables, and validate the factor structure. IBM® SPSS ® 27 was used for EFA. Skewness and Kurtosis values were used to identify the normality of the data. All indicators of latent factors exhibited fairly normal distributions of skewness and kurtosis with the highest values reported for item 3 with a skewness of -1.22 and item 1 with a kurtosis of 1.22 (Sposito et al., 1983). Next, Kaiser-Meyer-Olkin (KMO) value was assessed for measure of sampling adequacy (MSA). A KMO value of 0.848 was reported for this initial EFA. The reported Bartlett's test of sphericity significance of $p < 0.001$ was acceptable.

Although the initial EFA extracted four factors, it failed to produce a factor structure with a clear grouping of variables. The primary issue was related to items cross-loading onto multiple factors as shown in Table 4. Therefore, an iterative process was conducted, removing one item at a time. The final solution produced a factor structure with a clear grouping of variables. Table 5 presents the factor loading for retained items and Cronbach's Alpha for the four constructs.

Table 4

Pattern Matrix[a]: Re-specified Model Assessment

Item	Factor 1	Factor 2	Factor 3	Factor 4
Item1	-	-	-	0.706
Item2	-	-	-	0.885
Item3	-	-	-	0.620
Item4	0.391	-	-	0.288
Item5	0.658	-	-	-
Item6	0.937	-	-	-
Item7	0.668	-	-	0.228
Item8	0.961	-	-	-
Item9	-	0.945	-	-
Item10	-	0.899	-	-
Item11	-	0.258	-	0.240
Item12	-	0.390	-	-
Item13	-	0.251	0.530	-
Item14	-	-	0.768	-
Item15	-	-	0.740	-
Item16	-	-	0.728	-

Note. Extraction method: Maximum likelihood. Rotation method: Promax with Kaiser

normalization

[a]Rotation converged in 6 iterations.

Table 5

EFA Factor Loading and Construct Reliability: Re-specified Model Assessment

Construct	Items	Factor Loadings	Cronbach's Alpha
Personal Escape (PE)	Item1: I feel this would help me get away from my personal environment	0.629	
	Item2: I feel this would help me escape from my everyday life	0.966	0.771
	Item3: I feel this would result in a change in pace from my everyday life	0.543	
Interpersonal Escape (IE)	Item5: I feel this would help me escape challenges in my social environment	0.605	
	Item6: I feel this would help me avoid interactions with others in my everyday life	0.911	0.861
	Item8: I feel this would help me avoid others who annoy me in my everyday life	0.897	
Personal Seeking (PS)	Item9: I feel this would increase value in myself	0.908	
	Item10: I feel this would increase my self-worth	0.926	0.762
	Item12: I seek new experiences by myself	0.385	
Interpersonal Seeking (IS)	Item14: I feel this helps me to meet new people	0.753	
	Item15: I feel this provides opportunity to be with others of similar interests	0.742	0.793
	Item16: I feel this would allow me to participate in a novel interaction with others	0.728	

Note: Adapted from "Modeling Iso-Ahola's motivation theory in the tourism context," by

D. Snepenger, J. King, E. Marshall, and M. Uysal, 2006, *Journal of Travel Research, 45*.

For the resultant items and factors, the KMO value is 0.779, and Bartlett's test of sphericity was statistically significant ($p < 0.001$). Convergent validity was adequate as factor loadings were above .5 for all but one item (item 12). Discriminant validity is adequate as there are no cross loading between factors.

Confirmatory factor analysis (CFA) was conducted to assess the measurement model with the four constructs identified in EFA, as shown in Table 2. The CFA model was tested using IBM ® SPSS ® AMOS 27. First, Skewness and Kurtosis values were assessed to evaluate the normality of the data. Acceptable normality values for CFA are between -7 and 7 (Byrne, 2016). The results show Skewness and Kurtosis values for all question items are between -7 and 7, indicating the normality assumption is met. The next step in CFA is to assess model fit. Table 6 shows the initial CFA model did not have good fit with RMSEA or CMIN/df (Byrne, 2016). Therefore, as recommended by Byrne (2016), modification indices (MI) were examined and error terms with high MIs with theoretical context were covaried in an iterative process. Satisfactory model fit for the final model, shown in Figure 1, was achieved as shown in Table 6.
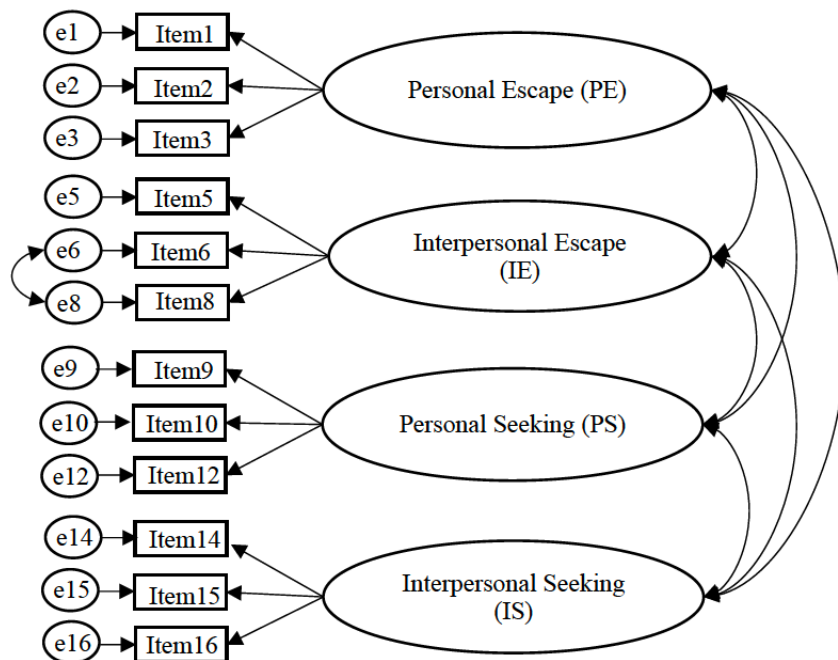
Figure 1

CFA Model

Table 6

CFA Model Comparison

Goodness-of-fit indices	Initial Model	Final Model	Recommended Value	Source
CFI	0.961	0.975	≥0.95	Byrne, 2016; Hair et al., 2018
NFI	0.943	0.957	≥0.90	Byrne, 2016; Hair et al., 2018
GFI	0.951	0.962	≥0.90	Byrne, 2016; Hair et al., 2018
AGFI	0.920	0.938	≥0.90	Byrne, 2016; Hair et al., 2018
RMSEA	0.065	0.053	≤0.06	Byrne, 2016; Hair et al., 2018
CMIN/df ($\chi 2$ /df)	2.999	2.323	$1< \chi 2/df<3$	Byrne, 2016; Hair et al., 2018

With good CFA model fit, the construct validity were assessed. Cronbach's Alpha and Construct Reliability (CR) scores are used to calculate construct reliability. Cronbach's Alpha and CR values for all four factors are greater than 0.7, indicating good construct reliability (Byrne, 2016; Hair et al., 2018; Kline, 2016). Convergent validity and discriminant validity were calculated to assess construct validity. Convergent validity was assessed with factor loadings and Average Variance Extracted (AVE). Satisfactory convergent validity is represented by both factor loadings and AVE equal to or greater than 0.5 (Hair et al., 2018; Kline, 2016). All factor loadings, except item 12, are greater than 0.5. With a sample size greater than 350, a factor loading greater than .30 can be considered acceptable (Dragan & Topolsek, 2014). Additionally, PS has acceptable construct reliability and validity. AVE values for all four factors are also greater than 0.5. Lastly, a comparison between Maximum Shared Variance (MSV) and AVE of each construct was conducted to assess discriminant validity. The MSV for each factor is less than the AVE value of the same factor; therefore, it can be concluded discriminant validity is attained for each factor. These results are listed in Table 7. Supplementary demonstration of discriminant validity is revealed in Table 8, with the square root of AVE greater than the inter-construct correlations.

Table 7

Convergent Validity, Divergent Validity, and Construct Reliability

Factors	Items	Factor Loadings	CR	Cronbach's Alpha	AVE	MSV
Personal	1	0.816	0.778	0.771	0.546	0.382
Escape (PE)	2	0.813				
	3	0.557				
Interpersonal	5	0.883	0.821	0.861	0.606	0.382
Escape (IE)	6	0.725				
	8	0.717				
Personal	9	0.924	0.799	0.762	0.597	0.260
Seeking (PS)	10	0.893				
	12	0.375				
Interpersonal	14	0.740	0.794	0.793	0.562	0.109
Seeking (IS)	15	0.777				
	16	0.731				

Table 8

Discriminant Validity Demonstrated by Inter-Construct Correlations Being Less than the Square Root of AVE (diagonal in bold)

	PE	IE	PS	IS
PE	**0.739**			
IE	0.618	**0.779**		
PS	0.392	0.510	**0.773**	
IS	0.330	0.156	0.289	**0.750**

Discussion

Point-to-point suborbital space tourism is projected to be a viable market for the space

industry. The adventure, novelty, and prestige of suborbital space flight motivates potential

point-to-point suborbital space tourists. No previous study has evaluated point-to-point

suborbital space flight within the theoretical foundation of the theory of tourism motivation. The

objective of this study was to validate the theory of tourism motivation for use in point-to-point suborbital space tourism research.

Iso-Ahola (1982) proposed the theory of tourism motivation with four dimensions, personal escape, personal seeking, interpersonal escape, and interpersonal seeking. Snepenger et al. (2006) validated an operational model with undergraduate students in the United States using the model to assess these four constructs. Biswas (2008) noted Snepenger et al.'s (2006) disconnects in listing the description for 3-items per construct but running CFA with 4-items per construct. Nonetheless, to validate use of the model in the Indian context, Biswas (2008) conducted research using 3-items per construct based on Snepenger et al.'s (2006) descriptions. Biswas (2008) dropped one item for personal escape and one item for interpersonal seeking due to cross-loading, but validated Snepenger et al.'s (2006) four-dimension model with similar results. Thanabordeekj and Nipasuwan (2017) conducted research similar to Biswas (2008) to validate Snepenger et al.'s (2006) model for Chinese tourists in Thailand. They retained all twelve items (3 items per construct), and validated, via CFA, the four-dimension model had the best fit.

When applied to point-to-point suborbital space travel, the initial model assessment from this research resulted in a model with 3 factors. As noted by Biswas (2008) and this research, Snepenger et al's (2006) CFA models used 4-items per construct despite providing descriptions for only 3-items per construct. These findings led the researchers to modify the item descriptions and add one item for each construct.

The re-specified model assessment resulted in a model with the same four constructs as Biswas (2008), Snepenger et al. (2006), and Thanabordeekj and Nipasuwan (2017). EFA resulted

in 3-items per construct, and, with CFA, the four-dimension model demonstrated good model fit with construct reliability and validity.

Practical Applications

This research study validated a model that operationalizes the four-dimensions of Iso-Ahola's (1982) theory of tourism motivation. The modified item descriptions from Snepenger et al.'s (2006) original research provide a valid and reliable model for use in future suborbital space travel research. Additionally, this scale can transcend into other tourism research. Finally, this research increases the generalizability of this model as MTurk provides access to a pool of diverse participants across education, demographic and dispositional variables (Mason & Suri, 2012; Mehta et al., 2019; Sheehan, 2018). This increased pool of diverse participants from the sample of United States participants provides for broader generalizability beyond the previous three studies using the initial operationalized model (Biswas, 2008; Snepenger et al., 2006; Thanabordeekj & Nipasuwan, 2017).

Limitations

The use of a convenience sampling strategy with MTurk has the potential to introduce selection bias (Vogt et al., 2012). To decrease sampling bias, a generic description of the survey was used to ensure potential participants could assess the nature of the study without the survey being more or less attractive to respondents of a particular demographic or characteristic (Goodman & Paolacci, 2017). The general description provided the study participants the opportunity to participate based on the title and explanation of the survey, payment for survey completion, the perceived survey completion time, and other potential motivational factors.

Additionally, although the personal seeking (PS) dimension achieved acceptable reliability and validity, the authors recognize a lower than optimum factor loading for item 12.

Future research should focus on the reliability and validity of item 12 for potential improvements.

Conclusion

The purpose of the current study was to validate a model for the four dimensions of the theory of tourism motivation for use in point-to-point suborbital space tourism research. Previous research demonstrated the four dimensions of Iso-Ahola's (1982) theory of tourism motivation (personal escape, personal seeking, interpersonal escape, and interpersonal seeking) can be assessed using structural equation modeling as applied to undergraduate students in the United States, Indians, and Chinese tourists in Thailand. This research furthered the body of knowledge of the operationalized model of four-dimension theory of tourism motivation in United States participants, and the modified item descriptions from Snepenger et al.'s (2006) original research provide a valid and reliable scale for use in future suborbital space travel research.

References

Albayrak, T., & Caber, M. (2018). A motivation-based segmentation of holiday tourists participating in white-water rafting. *Journal of Destination Marketing and Management, 9*, 64-71. https://doi.org/10.1016/j.jdmm.2017.11.001

Ao, J. (2018). *Ride of a lifetime: A netnographic research to unveil the leisure experience attached to orbital space tourism.* [Doctoral dissertation, Middle Tennessee State University]. ProQuest One Academic.

Baugh, B. S., Musselman, B. T., Simpson, M. & Winter, S. R. (2018). *Commercial space travel for the masses, but will people ride? A preliminary analysis* [Poster presentation]. University Aviation Association Annual Education Conference, Irving, TX, United States.

Beard, J. G., & Ragheb, M. G. (1983). Measuring leisure motivation. *Journal of Leisure Research, 15*(3), 219-228. https://doi.org/10.1080/00222216.1983.11969557

Berrisford, C. (2018). *Longer term investments: Space*. UBS Global Wealth Management.

Biswas, M. (2008). Confirmatory factor analysis of Iso-Ahola's motivational theory: An application of structural equation modeling. Proceedings of the Conference on Tourism in India: Challenges Ahead.

Buhrmester, M., Kwang, T., & Gosling, S. D. (2011). Amazon's Mechanical Turk: A new source of inexpensive, yet high-quality, data? *Perspectives on Psychological Science, 6*(1), 3-5. https://doi.org/10.1177/1745691610393980

Byrne, B. M. (2016). *Structural equation modeling with AMOS: Basic concepts, applications, and programming*. Routledge. https://doi.org/10.4324/9781315757421

Caber, M., & Albayrak, T. (2016). Push or pull? Identifying rock climbing tourists' motivations. *Tourism Management, 55*, 74-84. https://doi.org/10.1016/j.tourman.2016.02.003

Chang, E. Y.-W. (2020). From aviation tourism to suborbital space tourism: A study on passenger screening and business opportunities. *Acta Astronautica, 177*, 410-420. https://doi.org/10.1016/j.actaastro.2020.07.020

Chang, Y.-W. (2015). The first decade of commercial space tourism. *Acta Astronautica, 108*, 79-91. https://doi.org/10.1016/j.actaastro.2014.12.004

Chang, Y.-W. (2017). A preliminary examination of the relationship between consumer attitude towards space travel and the development of innovative space tourism technology. *Current Issues in Tourism, 20*(14), 1431-1453. https://doi.org/10.1080/13683500.2015.1005580

Chen, L.-J., & Chen, W.-P. (2015). Push-pull factors in international birders' travel. *Tourism Management, 48*, 416-425. https://doi.org/10.1016/j.tourman.2014.12.011

Correia, A., Oom do Valle, P., & Moço, C. (2007). Why people travel to exotic places. *International Journal of Culture, Tourism and Hospitality Research, 1*(1), 45-61. https://doi.org/10.1108/17506180710729600

Crompton, J. L. (1979). Motivations for pleasure vacation. *Annals of Tourism Motivation, 6*(4), 408-424. https://doi.org/10.1016/0160-7383(79)90004-5

Dann, G. M. S. (1977). Anomie, ego-enhancement and tourism. *Annals of Tourism Research, 4*(4), 184-194. https://doi.org/10.1016/0160-7383(77)90037-8

Dragan, D., & Topolsek, D. (2014, June 19-21). *Introduction to structural equation modeling: Review, methodology and practical applications* [Paper]. The International Conference on Logistics & Sustainable Transport, Celje, Slovenia.

Fodness, D. (1994). Measuring tourist motivation. *Annals of Tourism Research, 21*(3), 555-581.

    https://doi.org/10.1016/0160-7383(94)90120-1

Foust, J. (2021a, July 11). *Branson flies to the edge of space on SpaceShipTwo*. Space News.

    https://spacenews.com/branson-flies-to-edge-of-space-on-spaceshiptwo/

Foust, J. (2021b, July 20). *Blue Origin launches Bezos on first crewed New Shepard flight*. Space

    News. https://spacenews.com/blue-origin-launches-bezos-on-first-crewed-new-shepard-

    flight/

Fullerton, R. A. (2013). The birth of consumer behavior: Motivation research in the 1940s and

    1950s. *Journal of Historical Research in Marketing, 5*(2), 212-222.

    https://doi.org/10.1108/17557501311316833

Gaskin, J. (2022, December 4). *Exploratory factor analysis*. StatWiki.

    http://statwiki.gaskination.com/index.php?title=EFA

Germine, L., Nakayama, K., Duchaine, B. C., Chabris, C. F., Chatterjee, G., & Wilmer, J.

    (2012). Is the web as good as the lab? Comparable performance from web and lab in

    cognitive/perceptual experiments. *Psychonomic Bulletin & Review, 19*, 847-857.

    https://doi.org/10.3758/s13423-012-0296-9

Goodman, J. K., & Paolacci, G. (2017). Crowdsourcing consumer research. *Journal of Consumer

    Research, 44*, 196-210. https://doi.org/10.1093/jcr/ucx047

Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2018). *Multivariate Data

    Analysis* (8th ed.). Cengage.

Hanquin, Z. Q., & Lam, T. (1999). An analysis of mainland Chinese visitors' motivations to visit Hong Kong. *Tourism Management, 20*, 587-594. https://doi.org/10.1016/S0261-5177(99)00028-X

Iso-Ahola, S. E. (1982). Toward a social psychological theory of tourism motivation: A rejoinder. *Annals of Tourism Research*, *9*(2), 256-262. https://doi.org/10.1016/0160-7383(82)90049-4

Jamrozy, U., & Uysal, M. (1994). Travel motivation variations of overseas German visitors. *Journal of International Consumer Marketing, 6*(3/4), 135-160.

Johnson, M. R., & Martin D. (2016). The anticipated futures of space tourism. *Mobilities, 11*(1), 135-151. https://doi.org/10.1080/17450101.2015.1097034

Khuong, M. N., & Ha, H. T. T. (2014). The influences of push and pull factors on the international leisure tourists' return intention to Ho Chi Minh City, Vietnam: A mediation analysis of destination satisfaction. *International Journal of Trade, Economics and Finance, 5*(6), 490-496. https://doi.org/10.7763/IJTEF.2014.V5.421

Kim, K., Jogaratnam, G., & Noh, J. (2006). Travel decisions of students at a U.S. university: Segmenting the international market. *Journal of Vacation Marketing, 12*(4), 345-357. https://doi.org/10.1177/1356766706067606

Klenosky, D. B. (2002). The "pull" of tourism destinations: A means-end investigation. *Journal of Travel Research, 40*, 385-395. https://doi.org/10.1177/004728750204000405

Kline, R. B. (2016). *Principles and practices of structural equation modeling*. Guilford Press.

Mason, W., & Suri, S. (2012). Conducting behavioral research on Amazon's Mechanical Turk. *Behavioral Research, 44*, 1-23. https://doi.org/10.3758/s13428-011-0124-6

Mehta, R., Rice, S., Winter, S., Spence, T., Edwards, M., & Candelaria-Oquendo, K. (2019). Generalizability of effect sizes within aviation research: More samples are needed. *International Journal of Aviation, Aeronautics, and Aerospace, 6*(5). https://doi.org/10.15394/ijaaa.2019.1404

Musselman, B., & Hampton, S. (2020). Factors influencing the emergence of suborbital space tourism. *International Journal of Aviation, Aeronautics, and Aerospace, 7*(2), 1-12.

Olya, H. G. T., & Han, H. (2020). Antecedents of space traveler behavioral intention. *Journal of Travel Research*, *59*(3), 1-17. https://doi.org/10.1177/0047287519841714

Pearce, P. L., & Caltabiano, M. L. (1983). Inferring travel motivation from travelers' experiences. *Journal of Travel Research*, *22*(2), 16-20. https://doi.org/10.1177/004728758302200203

Pearce, P. L., & Lee, U. (2005). Developing the travel career approach to tourist motivation. *Journal of Travel Research, 43*(3), 226-237. https://doi.org/10.1177/0047287504272020

Prayag, G. (2012). Senior travelers' motivations and future behavioral intentions: The case of Nice. *Journal of Travel and Tourism Marketing, 29*(7), 665-681. https://doi.org/10.1080/10548408.2012.720153

Rice, S., & Winter, S. R. (2020). A practical guide for using electronic surveys in aviation research: Best practices explained. *International Journal of Aviation, Aeronautics, and Aerospace, 7*(2). https://doi.org/10.15394/ijaaa.2020.1457

Rice, S., Winter, S. R., Doherty, S., & Milner, M. (2017). Advantages and disadvantages of using internet-based survey methods in aviation-related research. *Journal of Aviation Technology and Engineering, 7*(1), 58-65. https://doi.org/10.7771/2159-6670.1160

Rita, P., Brochado, A., & Dimova, L. (2019). Millennials' travel motivations and desired activities within destinations: A comparative study of the U.S. and the U.K. *Current Issues in Tourism, 22*(16), 2034-2050. https://doi.org/10.1080/13683500.2018.1439902

Reddy, M. V., Nica, M., & Wilkes, K. (2012). Space tourism: Research recommendations for the future of the industry and perspectives of potential participants. *Tourism Management*, *33*, 1093-1102. https://doi.org/10.1016/j.tourman.2011.11.026

Rogers, T. F. (2001). "Space tourism"--its importance, its history, and a recent extraordinary development. *Acta Astronautica, 49*(3-10), 537-549. https://doi.org/10.1016/S0094-5765(01)00125-4

Sheetz, M. (2019, March 18). Super fast travel using outer space could be $20 billion market, disrupting airlines, UBS predicts. CNBC. https://www.cnbc.com/2019/03/18/ubs-space-travel-and-space-tourism-a-23-billion-business-in-a-decade.html

Sheehan, K. B. (2018). Crowdsourcing research: Data collection with Amazon's Mechanical Turk. *Communication Monographs, 85*(1), 140-156. https://doi.org/10.1080/03637751.2017.1342043

Snepenger, D., King, J. Marshall, E., & Uysal, M. (2006). Modeling Iso-Ahola's motivation theory in the tourism context. *Journal of Travel Research, 45*(2), 140-149. https://doi.org/10.1177/0047287506291592

Sposito, V. A., Hand, M. L., & Skarpness, B. (1983). On the efficiency of using the sample kurtosis in selecting optimal l_p estimators. *Communications in Statistics-Simulation and Computation, 12*(3), 265-272. https://doi.org/10.1080/03610918308812318

Thanabordeekj, P., & Nipasuwan, N. (2017). Confirmatory factor analysis of Iso-Ahola's

motivational theory: An investigation on Chinese tourists in Thailand. *Panyapiwat*

Journal, 9(3), 229-241.

Vogt, W. P., Gardner, D. C., & Haeffele, L. M. (2012). *When to use what research design*.

Guilford Press.

Ward, K. A. (2020). Safety systems, culture, and passengers' willingness to fly in autonomous

air taxis. [Doctoral dissertation, Embry-Riddle Aeronautical University].

https://commons.erau.edu/edt/543

Whyte, L. J. (2017). Understanding the relationship between push and pull motivational factors

in cruise tourism: A canonical correlation analysis. *International Journal of Tourism*

Research, 19(5), 557-568. https://doi.org/10.1002/jtr.2129

Yousaf, A., Amin, I., & Santos, J. A. C. (2018). Tourists' motivations to travel: A theoretical

perspective on existing literature. *Tourism and Hospitality Management, 24*(1), 197-211.

https://doi.org/10.20867/thm.24.1.8

Yousefi, M., & Marzuki, A. (2015). An analysis of push and pull motivational factors of

international tourists to Penang, Malaysia. *International Journal of Hospitality &*

Tourism, 16(1*)*, 4-56. https://doi.org/10.1080/15256480.2015.991987

Appendix

The Original 12 Items (Snepenger et al., 2006) and Re-specified Items

Latent Variable	Original Model	Re-specified Model
Personal Escape	1. To get away from normal environment	[a]1. I feel this would help me get away from my personal environment
	2. To have a change from every life	[a]2. I feel this would help me escape from my everyday life
	3.To overcome a bad mood	[a]3. I feel this would result in a change in pace from my everyday life
	-	4. I feel this would help me avoid the stress in my everyday life
Interpersonal Escape	4.To avoid people who annoy me	[a]5. I feel this would help me escape challenges in my social environment
	5.To get away from stressful environment	[a]6. I feel this would help me avoid interactions with others in my everyday life
	6.To avoid interactions with others	7. I feel this would help me get away from my social environment
	-	[a]8. I feel this would help me avoid others who annoy me in my everyday life
Personal Seeking	7.To tell others about my experience	[a]9. I feel this would increase value in myself
	8.To feel good about myself	[a]10. I feel this would increase my self-worth
	9.To experience new things by myself	11. I feel this would allow me to participate in a novel event by myself
	-	[a]12. I seek new experiences by myself
Interpersonal Seeking	10.To be with people of similar interests	13. I seek new experiences with others
	11.To bring friends	[a]14. I feel this helps me to meet new people
	12.To meet new people	[a]15. I feel this provides opportunity to be with others of similar interests
	-	[a]16. I feel this would allow me to participate in a novel interaction with others

[a] Items re-specified retained in the model