FACTORS INFLUENCING POTENTIAL TOURISTS' DESIRE TO PARTICIPATE IN ORBITAL SPACE TOURISM

By

LUYU WANG

A THESIS PRESENTED TO THE GRADUATE SCHOOL
OF THE UNIVERSITY OF FLORIDA IN PARTIAL FULFILLMENT
OF THE REQUIREMENTS FOR THE DEGREE OF
MASTER OF SCIENCE

UNIVERSITY OF FLORIDA

2017

To my Mom and Dad

ACKNOWLEDGMENTS

I would first like to thank my thesis advisor Dr. Svetlana Stepchenkova and committee members, Dr. Andrei Kirilenko and Dr. Kumar Pradeep. I would also like to thank the copy editor Andrea Caloiaro of the English Department at University of Florida.

TABLE OF CONTENTS

page

Abstract of Thesis Presented to the Graduate School
of the University of Florida in Partial Fulfillment of the
Requirements for the Degree of Master of Science

FACTORS INFLUENCING POTENTIAL TOURISTS' DESIRE TO PARTICIPATE IN ORBITAL SPACE TOURISM

By

Luyu Wang

August 2017

Chair: Svetlana Stepchenkova
Major: Recreation, Parks and Tourism

The importance of tourists' potential desire to travel to space as an emergent destination has drawn scholars' interests in understanding the influential factors of orbital space tourism. This study adopts a theoretical framework based on push and pull travel motivation. The study was conducted through an online quantitative survey collected from respondents who queried about their interest in orbital space tourism, in order to explore the interrelationships amongst the following variables: level of involvement, push and pull motivation, perceived riskiness, and desire to participate. This study aims to facilitate an understanding of the interrelationships between these constructs. A total of 173 questionnaires were collected. Fifteen push motives and 10 pull motives regarding tourists' potential for orbital travel have been analyzed. Factor analysis found four underlying push factors: novelty, thrill-seeking and adventure, escape and prestige, and three key pull factors: beauty and excitement, adventure and activities, and scientific contribution; all these factors influence tourists' desire to participate in orbital space travel. This study reveals that tourists' motivations have a relationship with perceived riskiness and the destination's characteristics; likewise,

perceived riskiness and destination characteristics are the determinants of their desire for travel.

CHAPTER 1
INTRODUCTION

Problem Statement

For a long time, space tourism seemed to be an intangible dream. Even today, it is still mysterious to the general public. Space tourism is defined as ordinary people of the public buying tickets or admission to travel to space and back（Chindarath et al., 2008). Private firms like Space Adventure, Virgin Galactic, and Blue Origin are focusing on offering unique suborbital and orbital tourism packages. Suborbital space tours include bringing tourists to the edge of space at a 100km altitude. Tourists will enjoy the view of partial Earth, the view of space, and several minutes of weightlessness (space.com, 2011). Orbital tours have, in fact, already been available through Space Adventure since 2011. Space Adventure's tours cover the journey to International Space Station, which is in about 400km orbit (meteorides.com, 2015). Also, space tourism corporations are now generating concepts for lunar tours (Webber, 2013); moreover, Mars is now being considered as a permanent human settlement destination (mars-one.com, 2016).

Space tourism has caught the public's attention, and more and more people have become interested in it. Iwasaki, Kanayama, and Ohnuki (1993) conducted the very first market research on the potential demand for orbital space tourism. Their results show that the idea of space tourism was very popular, even 23 years ago. According to Collins and Autino (2010), orbital space tourism as a new industry has enormous potential to generate new employment, stimulate economic growth, and increase interest and improve education in STEM disciplines.

In 1995, two small-scale surveys were conducted in Toronto and Berlin. A nationwide telephone survey of 1020 people was carried out in Canada and USA (Spacefuture.com, 2016). The results show that 60% of the people surveyed were interested in traveling to space as a vacation. All these surveys found that the idea of space tourism is a very popular idea for the public (Abitzsch, Collins et al., 1998). According to a Good Morning America survey (ABC News, 2008) in 2008, 65% of Americans thought that in the future, ordinary people would travel to outer space. Moreover, 39% said that if they had the chance, they would go for it. In other words, four in ten Americans are up for a ride to space.

Research indicates that there is a large, worldwide consumer market for the space travel experiences (Chang, 2015). Collins (2014) states that by 2100, there could be 40 million orbital travelers annually. He also indicates that by the 2030s, an orbital trip will cost $N0, 000. According to the data released by “Newsroom” of Kennedy Space Center Visitor Complex (media.kennedyspacecenter.com, 2016), there are more than 1.5 million guests from around the world who visit their space adventure exhibit. In 2014, there were approximately 6.7 million visitors at the Smithsonian Air and Space Museum in Washington DC and similar museums in other countries (Wikipedia, 2016). While visiting museums is considered the lowest level of interest according to space travel marketing (Crouch, 2001), the interest in orbital space flights is increasing as well.

Why do people desire to go to space? The motivations of actual and prospective space tourists to undertake space flight, and the general public’s perceptions of space tourism, have yet to be studied in depth. Many researchers continuously mention risk related issues of space exploration regarding the safety of astronauts. They include the

dangers of ascent and re-entry, the hostility of the space environment for a person's physical and psychological wellbeing, and the possibility of technology failure (Bensoussan, 2010). Also, space tourists will have to accept some medical risks such as potential bone loss, muscle loss, and radiation hazards (Buckley, 2006). At the same time, the risk factors associated with space travel may well act as the motivating factors for some groups of tourists. The literature on motivation for participating in extreme sports and activities like, for example, skydiving, rock climbing and parachuting, found that the novelty of the activity, its risky nature, and the level of proficiency required to be unharmed while performing the activity are all powerful motivators for the people with high tolerance to risk (Farley, 1991; Lee & Crompton, 1992; Celsi et al., 1993; Ray, 2003). However, overall, the characteristics of the space tourism experience and their importance for making a decision to participate in space tourism have not been sufficiently investigated.

It has been 16 years since the first space tourist traveled to the International Space Station. There are a significant number of books and technical reports, but not yet a dedicated, sustained study on "Space Tourism Motivation." There are already some studies including publications or websites dealing with aspects of space travel, from vehicle design, health, accommodation, among other topics. These studies are more related to challenges and prospects. The lack of motivation-related research is apparent. Thus, this thesis will investigate the motivations of tourists who intend to participate in orbital space tourism.

The Past and Present of Space Tourism

In the 1960s, Barron Hilton from Hilton Hotels gave a presentation at the 13th Annual Meeting of the American Astronautical Society wherein he discusses the

possibilities of touristic orbiting and lunar hotels. Following Hiltons' presentation, Krafft Ehricke gave a speech on the subject of "Space tourism," which is the idea of traveling to space for no other reason than having fun (Abitzsch, 1996). Wikipedia defines space tourism as "space travel for recreational, leisure or business purposes" (Wikipedia, 2016). The expression "space tourism" is broadly defined as "any commercial activity offering customers direct or indirect experience with space travel" with the qualification that space tourism does not necessarily imply activities taking place in outer space (Loizou, J. 2006). Cole (2015) summarized a sequence of three phases of space tourism. Detailed information about the status of space tourism, space tourism products, price expectations and volume of travelers is shown in Table 1-1.

Table 1-1. Phases of space tourism.

Stage	Tourism product	Price and volume
Pioneering	The product will be similar to adventure travel than to luxury travel. Orbital accommodations will be safe but economical.	Tourists will be considerably few – from hundreds to thousands per year; prices will be high, $50,000 and up.
Mature	Mature stage contains demand increasing, and flights will take off from different locations.	Tickets will drop down and tourists number will more than 100,000 per year.
Mass	Orbital facilities will grow to large orbiting structures for hundreds of tourists with a range of orbital entertainment.	Ticket prices will fall to a few thousands and space tourists will increase to millions of passengers per year.

* Cole, S. (2015). Space tourism: prospects, positioning, and planning. *Journal of Tourism Futures*, *1*(2), 131-140.

The related term "commercialized space travel" is also used to describe ordinary publics engaging in space tourism. It is different from traditional space exploration, which for most cases, the government oversees and is not for leisure. Space tourism is also different since the goal of non-leisurely space exploration is to 'discover and explore celestial structures in outer space using continuously evolving and growing

space technology.' Furthermore, commercialized space travel carries tourists and not scientists, and with no scientific facilities, while non-commercial space travel carries astronomers and research equipment.

According to Laing and Crouch (2004), the space tourism market can be broken down into the five categories which are virtual, terrestrial, nest-space, suborbital and low-orbital/high-orbital space tourism. Each category consists of distinct experiences, which are shown in Table 1-2.

Table 1-2. Different types of commercial space travel.

Type	Experience
Virtual	Virtual reality helmets allowing people to gain a bird's eye view into space
Terrestrial	Incorporating space camp, theme park, space museum, and other activities together to provide a space experience without leaving Earth's surface
Near-space	Very high altitude cruises allowing people to experience short periods of weightlessness and high altitude sightseeing
Suborbital	Bringing people to sufficiently high altitudes to watch Earth's curvature and the blackness of space without leaving Earth orbit
Low-orbital /high-orbital	Actual Earth orbital experiences lasting from hours to days or even weeks

* From Laing, J., Crouch, G. I., & Singh, T. V. (2004). Vacationing in space: tourism seeks ‘new skies.’ New horizons in tourism: Strange experiences and stranger practices, 11-25.

Virtual space tourism does not require an active participant. The virtual reality mode is widely used by scientific agencies and entertainment companies. For instance, the Future World of Disneyland offers weightlessness and overweight experience to tourists. Similarly, the Kennedy Space Center Visitor Complex offers launching and landing simulations with virtual space views. These are alternatives to going to space for people unwilling to leave Earth or are concerned about the safety of orbital space tourism. Furthermore, virtual space tourism can pique the interests for the general publics because of its increasing accessibility.

Terrestrial space tourism includes space theme parks and museums. Tourists can enjoy a space-related experience without actually leaving Earth’s surface. For example, people can watch rocket lances when they visit Cape Canaveral in Florida and can see exhibits such as the Apollo 11 command module in the National Air and Space Museum at the Smithsonian in Washington, DC. Moreover, some private companies also engage in terrestrial space tourism. Space Adventure accepts bookings for future sub-orbital trips, and it also provides land-based training programs.

Near-space tourism refers to a short period of weightless or very high-altitude supersonic sightseeing trip. Zero Gravity Corporation (Zero-G) already takes tourists on a weightless trip by using a modified Boeing 727-200. The aircraft's parabolic flight patterns temporarily counteract Earth's gravity, thereby creating prolonged weightlessness and giving those inside the chance to experience what it feels like to float free in space (David, L., 2004). Additionally, Balloon trip is becoming a new form of near-space space tourism. The space tourism company, World View Enterprises, will be carrying passengers 30 km into space by using a pressurized capsule that is hauled up by an air balloon for a two-hour view of the earth's curve.

Suborbital space tourism includes several minutes of gravity-free experience. XCOR started test flights in 2014. It will be another 6-18 month before the company is ready to ferry passengers to space. Tourists will travel on Lynx rocket to Earth sub-orbit at a height of 100km. XCOR has sold about 300 tickets at $95,000 each, which has given it enough funds to develop its spacecraft. Virgin Galactic is scheduled to start sub-orbital space tourism by 2015, and the vehicle is SpaceShipTwo featuring the Astrobatic cabin, which is capable of carrying six passengers up to 109 km above the earth’s

surface, at a price $250,000 per passenger. The enterprise calls its space tourists future astronauts, numbering about 600 already. Besides the space tour, paying tourists also obtain opportunities to experience special activities like G-force training, test flight celebrations in the Mojave Desert, and some trips with the company founder, Richard Branson (Financesonline.com, 2016).

In this thesis, we will focus on orbital space tourism. Orbital space tourism refers to low-orbital and high-orbital space travel. These two types of experiences are the most costly type of space tourism, as well as the most potentially risky. Orbital space tourism is different from sub-orbital space tourism in the following two respects:

(1) Tourists will have only travel suborbitally in the former but travel to low Earth orbit in the latter; and

(2) Cost per tourist-trip of the former will be much cheaper than the latter.

We have arrived in 2017, 114 years after the first flight of the Wright Brothers, and 55 years after the first spaceflight of Yuri Gagarin, and orbital space tourism is already possible. Moreover, from a technical view, many successful reusable launch vehicle experiments show promise for a projected quick increase in the availability and interest in commercial orbital space tourism (NASASpaceFlight.com, 2016).

We are at a significant position between the early successes of the orbital space tourism industry for billionaires and orbital space tourism for the general public. This thesis looks ahead to investigate the push and pull motivations of potential orbital space tourism participants, and it underlines the relationship between these two motivational domains. Additionally, this study will identify the impact of risk on tourists' decisions of whether to participate in orbital space tourism.

Research Purpose

The space tourism industry has the potential to grow rapidly in the coming years, as technological advancements reduce the cost of space travel significantly, thereby making many other activities in space technologically feasible and financially affordable for a larger number of people. As there is a lack of studies on space tourism and, specifically, travel motivations and risk assessment for potential orbital space tourists, the purpose of this study is to contribute to this line of research. This study investigates motivations for space tourism and the risk perceptions associated with space travel. More specifically, this study examines the relationship between motivations for orbital space tourism, the risk perception of orbital space tourism, the level of involvement/knowledge about space tourism, and the desire to participate in orbital space tourism. The following research questions are posited in this study:

1. What are the main push and pull motivations for orbital space tourism?
2. How risky is orbital space tourism as perceived by people?
3. How do involvement, motivations, and risk variables affect a desire to participate?

CHAPTER 2
LITERATURE REVIEW

Travel motivation

The motivations of space tourists are important for tourism as a type of human behavior and as a million dollar emerging industry. Understanding why people travel to space and what factors influence their visitation to orbital destinations are of significant interest to many researchers. Maslow's (1943) hierarchy of needs and push and pull theories have been universally applied to investigate tourist's motivation. However, these motivational concepts and theories have not yet been studied about space tourism.

Travel motivation has been studied by many scholars from different perspectives such as psychology, sociology, and economics. From a psychological viewpoint, Maslow's (1943) hierarchy of needs is the most generally applied theory to investigate tourism motivation. His pyramid-shape model represents five tiers of human needs. From bottom to top, they are physiological needs (e.g., food), safety from physical harm, the feelings of love and belonging, self-esteem, and self-actualization. Some tourism scholars have applied the Maslow's model successfully to study tourist behavior (Pearce, 1982; Pearce & Caltabiano, 1983; Chon, 1989). For instance, Pearce (1982) applies Maslow's model to understand tourists' perception of holiday destinations. From tourists' actual travel experience, Pearce and Caltabiano (1983) employed a five-fold classification of travel motivation based on Maslow's theory. Chon (1983) also applies the Maslow's hierarchy to explain recreational traveler's motivation, attitude, and satisfaction to comprehend the psychological motivational factors that stimulate tourists.

Another approach, the push and pull framework, also provides a useful theoretical foundation for investigating the motivations underlying visitor and visitation behavior (Dann, 1977). Push and pull motivations often are described as the intrinsic and extrinsic motives to engage in a particular conduct. The internal forces refer to the inner desire of an individual to travel stimulated by that person's values and psychological needs. In contrast, external forces are related to those features, attractions, or attributes of the destination itself that are the most attractive to the individual. The external, pull factors influence the tourist's decision of which specific destination will eventually be selected (Crompton, 1979). The travel motivation evaluation is based on push and pull travel motivation model shown in Figure 2-1. Dayour and Adongo (2015) modified the push and pull travel motivation model generated by Yoon and Uysal (2005).

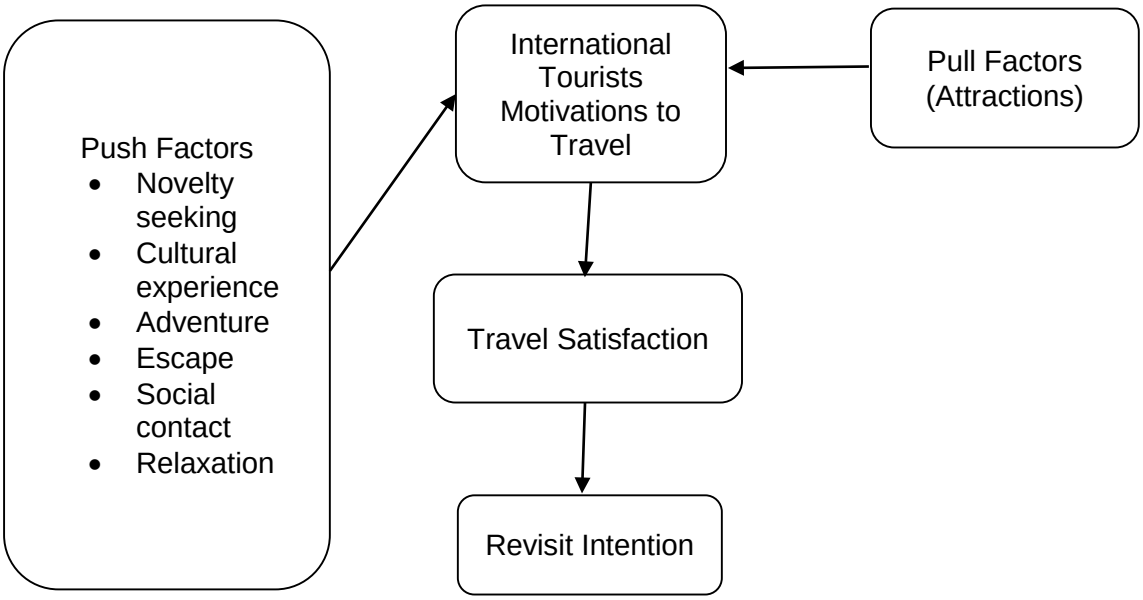

Figure 2-1. Framework of tourists' motivations and revisit intentions

Push and Pull Factors

Crompton (1979) identified the motives of pleasure vacationers and developed a conceptual framework capable of encompassing a number of the push and pull motives. There are seven motives categorized as socio-psychological, namely: escape from a perceived mundane environment, exploration and evaluation of self, relaxation, prestige, enhancement of kinship relationships, facilitation of social interaction, and regression. Regression refers to tourists' desire to regress to a simple, changeless and primitive environment. Regressive behavior refers to the search for a previous lifestyle or environment of the past, which is characterized and studied according to 'nostalgia factors.' All of these socio-psychological motives are considered as push factors.

There are two remaining motives – novelty and education, both which are categorized in the in the cultural category because these motives reflect the impact of the destination in influencing the tourist. Novelty is better known as curiosity, adventure, new and different experience. Many tourists prefer to travel to destinations that they have never been visited before. However, Crompton (1979) states that preference for new and adventurous experiences is often adjusted by feeling the need to minimize risks of exposure to novelty, which may be threatening. Education is the other important push factor. In tourism, it is associated with the sense that something should be seen. If a particular cultural or natural phenomenon is ephemeral (that is, going to disappear shortly), tourists will consider that there is only one opportunity in their lifetimes to obtain that experience and then obtain education on it. In this case, if the opportunity is not taken, then educational benefits are lost.

The seven socio-psychological motives are push factors because these motives are intrinsic forces that cause tourists to seek travel activities. And the two cultural

motives, novelty, and education are considered to be at least partially influenced by the particular qualities that a destination offers. Yiannakis and Gibson (1992) considered some tourists to be ‘seekers.' In relation to space tourism, these would be persons who, through space travel, seek to learn more about themselves, and ultimately, the meaning of existence. Accordingly, Laing and Chouch (2004) found that travel motivation is possibly related to the mental dimension or self-fulfilment.

Crompton’s push and pull theory has been widely accepted by many researchers (e.g., Iso-Ahola, 1982; Yuan & McDonald 1990; Jamrozy & Uysal, 1994, Kim, Lee, & Klenosky, 2003) to analyze tourism motivation. Before Crompton’s theoretical work, Dann (1977) identifies two push factors, anomie, and ego-enhancement, as two important travel motives. Anomie is a condition wherein it is deemed that society cannot provide enough moral standard or guidance to individuals. Dann (1977) introduces this term to the tourism setting. This concept is extended to “border scenes,” or remote destinations. He claims that border scenes would be a possible push factor for travel because tourists long for a feeling of isolation beyond everyday life. Tourists hope to get rid of it all because they need love and affection and social communication. For instance, a person lives in a big city with anomie environments, like exhausting work and a lack of social interaction or limited conversation with families, friends, and neighbors. In this case, the person can only gain the need of social interaction away from the original environment (e.g. when he/she is on vacation). Thus, he/she may prefer to travel as a result of a condition of anomie.

Ego-enhancement is another push factor, which pertains to the level of personal need for social interaction. Tourists often travel for the desire to be recognized or

acknowledged by others. Thus, ego-enhancement can also refer to the need for self-esteem. In this context, Dann's analysis strengthens two statuses of Maslow's hierarchy of needs from a sociological perspective; he argues that an examination of push factors should be antecedent to pull factors, and that travel motivation is only related to push factors. However, his framework overlooks the importance of destination characteristics as motivational factors. To account for this variable, it is necessary to consider Crompton's socio-psychological motives, which consider a destination's pull factors; as Crompton points out, for tourists, both escaping from a perceived mundane environment and the facilitation of social interaction are important pull factors that correspond to these two push factors.

Iso-Ahola (1982) presents another social psychological tourism motivation model. Unlike Crompton's theorization, he argues that there are only two main motivations for travel which are different amongst people: escaping and seeking. Iso-Ahola's model is similar to Dann's; tourists are eager to gain psychological benefits from recreational trips. These benefits include escaping from everyday and stressful surroundings and seeking recreational opportunities for psychological reward. In other words, the tourist is motivated to seek leisure or tourism activities to get away from personal and interpersonal issues of routine life and gain intrinsic reward. Personal rewards refer to competence or mastery, exploration, and relaxation; interpersonal rewards are more related to social interaction. This model is thus similar to Crompton's socio-psychological motivations.

Yuan and McDonald (1990) extend the findings of Dann (1977), Crompton (1979) and Iso-Ahola (1982) by examining the motivations for overseas pleasure travel among

tourists from Japan, France, West Germany and the UK. They identify five push factors: novelty, escape, prestige, enhancement of kinship relationships and relaxation/hobbies. Also, they regard novelty as the most important motivation factor. These push factors correspond to the findings of Dann (1977), Crompton (1979) and Iso-Ahola (1982).

One way of looking at the motivations for risk involved adventure tourism – like space travel – is to compare it to studies done on the motivations of other, adventure tourism activities. Zukerman (1983) states that extreme sports participants seek thrill, adventure, and novel experience. Celsi, Rose and Leigh (1993) explore voluntary high-risk consumption (e.g., skydiving) through a sociocultural approach. The basic form of skydiving is to free fall parachute jumps from an aircraft. They have the similar findings as Zukerman's. The reasons participating in skydiving are curiosity, thrill-seeking, social compliance, and adventure. These are push factors to skydiving. Also, the most frequently mentioned reason to take the first jump is the interpersonal influence. Interpersonal influence is from friends, classmates or relatives. Meanwhile, mass media publicity brings the awareness and initial motivation to skydivers.

Moreover, BASE jumping is the use of a parachute to jump from a high point. Richard and Celsi (1992) state that BASE jumpers are seeking high involvement, the sense of release, timelessness, and freedom. The mountain climbers have similar desires. The authors also mention that both BASE jumpers and mountain climbers are willing to share experiences to their community. In other words, they are seeking social interaction. These findings are similar to the traditional type of tourism activities.

Level of Involvement

When considering the motivations of space tourism, another important variable is level of involvement. According to Zaichkowsky (1985), involvement can be classified

into three categories: (1) personal – intrinsic needs, values, and interests; (2) physical – characteristics of an object that generate difference and increase interest; (3) situational – something that temporarily increases interest or relevance of an object. Zaichkowsky (1994) further describes level of involvement as a person's judgment on the importance of interest level of an object. Similarly, Manfredo (1989) considers involvement as the degree of interest in a recreational activity and the emotional responses correlated with that interest. He suggests four involvement dimensions out of 12 items: enjoyment, importance, self-expression, and centrality.

Measuring level of involvement amongst participants is a key aspect of analyzing space tourism because it reveals relationships between levels of involvement and actual participation. To measure level of involvement, Zaichkowsky (1985) developed the Personal Involvement Inventory (PII), and Laurent and Kapferer (1985) have generated the scale of Consumer Involvement Profiles (CIP). Many scholars use these scales to evaluate tourists' participant and behavior (e.g., Dimanche, Havitz & Howard, 1995; Gursoy and Gavcar, 2003; Hwang and Chen, 2005). Dimanche, Havitz, and Howard (1995) examined the involvement of college students in the setting of three recreational activities (golf, wind surfing, and downhill). They found positive relationships between length of participation and involvement.

Many studies have examined the relationship between motivation and involvement because of its potential impacts on people's attitudes and their decision-making intentions regarding a certain activity (Josiam, Smeaton & Clements, 1999; Kim, 2008; Prebensen et al.,). Josiam, Smeaton, and Clements (1999) conducted research on college students' travel intentions during spring break vacation in Panama City

Beach, Florida. Their study showed that these students have a significantly higher level of involvement than non-travelers and that a high level of involvement is considerably related to both push factors (e.g., Sun seeking and beach-front activities) and pull factors (e.g., 'Spring Break party reputation'). In a different study of students' top domestic and international destinations, Kim (2008) consider push motivations as a good predictor of cognitive involvement. Knowing the degree of a tourists' involvement is helpful for predicting space travel motivation.

The Characteristics of Space Tourism

As mentioned earlier, orbital space tourism is unique compared to other destinations. The features of the space tourism experience, which can be considered as pull factors of orbital space tourism, were investigated by Reddy, Nica, and Wilkes (2012). These authors surveyed British residents in Southern England to identify their attitudes toward space tourism. They concluded that the "vision of Earth from space" followed by "unusual experience," "weightlessness" and "high-speed experience" were the three essential motivational factors influencing potential space tourists. The least important motivation is 'scientific contribution.'

The key factors (ranked high to low) influencing space travel decision-making include:1) type of experience (orbital vs. sub-orbital space travel); 2) health and training requirements; 3) safety issues; 4) type of launch and design of the spacecraft (e.g.: number of window seats); 5) number of passengers onboard; 6) reputation of the operating company; 7) location of spaceports; 8) reliability statistics; and 9) environmental credentials.

There are numerous characteristics of space tourism that attract potential space tourism participants. Barrett (1999) provided an evaluation of the potential demand for

space tourism within the United Kingdom. The results show that the major attraction of space tourism to prospective tourists is viewing Earth from space. Toyohiro Akiyama (1993), a Japanese reporter and civil astronaut asserts that "sightseeing the Earth is very special; the feeling is more than just seeing the beauty, it is a psychological experience (Barrett, 1999)". The next two attractions are to look deeper into space and to walk in space. Being weightless, scientific experimentation, re-entry and space sports are other attractions. These characteristics of space tourism are significant pull factors.

Many significant views on space tourism from the general public are found in 'The Above Top Secret' forum. For example, commenting on the 'Vintage-Style Fantasy Space Tourism Posters from NASA,' Quantumgamer1776' states, "I think Jupiter and Enceladus are my favorites. Would've loved to see a Saturn one. NASA always leaves me wanting more (abovetopsecret.com, 2016)." User comments reveal that people's perceptions of the type of space tourism that they envision from extant sources are important influencing factors. 'OneGoal' replies, "The views, the thrills, the chills. Would be a great tourist attraction."

Another post, entitled, 'Secret space-tourism mothership unveiled' documents that more than 250 tourists have already paid a deposit of $200,000 for the opportunity to be one of Virgin Galactic's first space tourists (CBS News, 2008). 'Rhain' (abovetopsecret.com, 2008) posts "I wanna go too. Wow, what a dream vacation that would be. However, hefty price alone with it. I do not think they will be crying for passengers either." This content shows that price is also a significant factor to potential space tourism participants.

The Risks

Orbital space tourism is the riskiest type of modern space tourism. The most significant risks for tourists are potentially dangerous levels of radiation, extended weightlessness (White and Averner, 2001) and cardiovascular effects (Sides et al., 2005). Akiyama et al. (2000) suggest that the radiation in space might damage the brains of space travelers by accelerating the development of Alzheimer's disease. According to Talbot and Fisher (1985), spaceflight causes a reduction in red blood cell mass, called space anemia. This risk is a critical issue when considering the viability of space tourism.

In fact, the risk seems to be the main factor in disincentivizing interest in space tourism. Reddy, Nica, and Wilkes (2012) find that "risk" is potential tourists' primary reason for not being willing to travel into space, and represents 34% of total responses. In 1995 market research on the potential demand for space tourism was conducted by Collins, Stockmans, and Maita (1995) in Canada and the United States. This survey provides several reasons why people would not want to visit space even if the service was available. The results show that about 1/3 were concerned about safety. In this case, the risk is a preventive factor for tourists.

Looking at current motivation, the users "The Above Top Secret' forum are also concerned with safety issues. 'PimpyMcgibbins' thinks space tourism is a neat idea but also states that "we cannot even guarantee 100% that airplanes will not crash. Let alone a tourist spaceship that travels to space. I'd want to see how the first few flights went before I'd pay for that. Plus- who knows what's really out there that little plane/ship is at

risk for anything from comets to satellites or even UFOs dare I say (abovetopsecret.com, 2008)."

On the other hand, as researchers point out, general riskiness is actually a motivation for some prospective space tourists (Zurick, 1995; Celsi, Rose & Leigh, 1993). Reddy, Nica, and Wilkes (2012) find that respondents who are interested in space tourism claim that they have taken part in at least one extreme sport. In other words, participating in extreme sports has had a positive impact on their intention to take part in space tourism. It reveals that people's prior risk-taking behavior can directly influence their decision-making related to space travel. Risk stimulates people's motivation. For example, as forum user 'OneGoal' (abovetopsecret.com, 2008) states: "The views, the thrills, the chills. Would be a great tourist attraction."

In sum, tourists to a specific destination have been found to be influenced by some push factors including 'escape from routine life,' 'novelty,' 'prestige,' 'relaxation, 'social interaction,' and so forth. The push factors associated with extreme sports – such as, curiosity, thrill-seeking, social interaction, novelty, and adventure – bear significant resemblance to those of prospective orbital space tourism participants, and thus the former may shed light on identifying the latter. The pull factors of space tourism are mainly about the type of space tourism, the vision of Earth, space sports, and so forth. Further, risk plays a significant role in the intention to visit space. This study will identify the essential push and pull motivations, and examine whether one of the motivations is more important than others. Also, this study will identify how motivations, risks, and involvement variables affect the overall motivation to participate in orbital space tourism.

The research model representing relationships among different variables is shown in Figure 2-2.

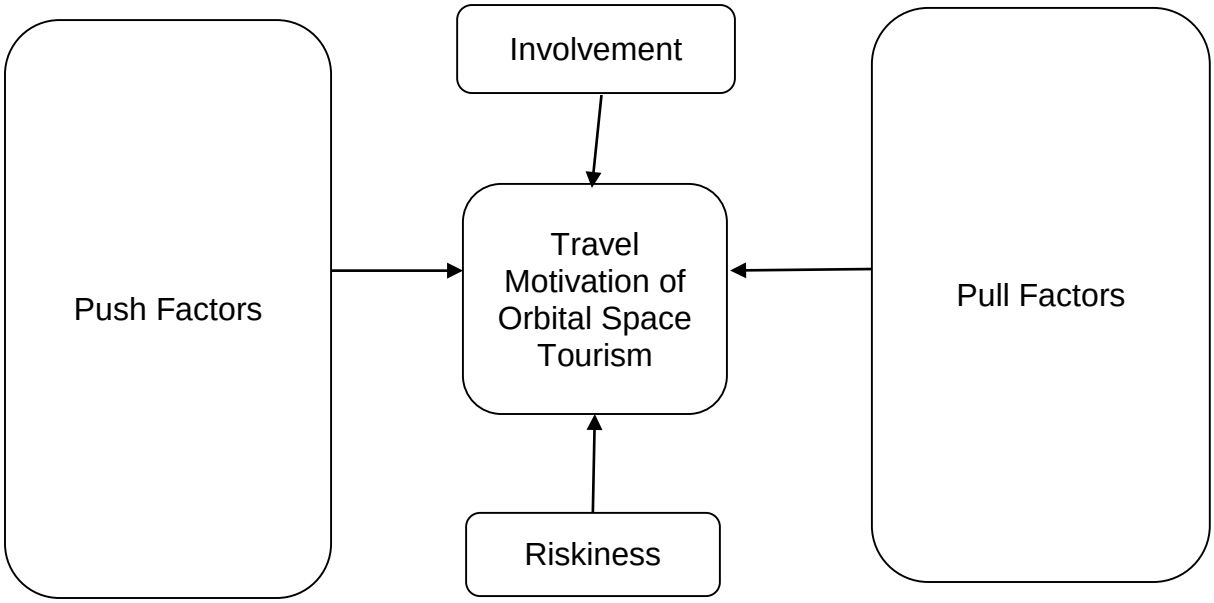

Figure 2-2. The research model

CHAPTER 3
METHODOLOGY

This study uses an online survey to answer the stated research questions: (1) What are the main push and pull motivations for orbital space tourism? (2) How risky is orbital space tourism perceived by people? (3) How do involvement, motivations, and risk variables affect a desire to participate? The approach is mainly quantitative. The questionnaire also involves an exploratory qualitative component to find out the most serious risks associated with space tourism and characteristics of an ideal imaginary space vacation.

The target population of the study was specified as people who potentially could be orbital space tourists in the future; that is, those people whose interests include travel in general as well as issues related to space, for example, space exploration, space technology, astronomy, etc. Future space tourists were also presumed to be younger. Thus, potential respondents were contacted through communications in thematic forums on social media (mainly Twitter and Facebook). As those people at thematic forums were presumed to have a relatively high level of involvement with space tourism, it was considered necessary to also reach younger people whose interests do not necessarily involve space tourism. With this in mind, invitation emails were sent to students of the University of Florida in the departments of Tourism, Recreation and Sport Management and Chemistry.

Survey Instrument

The following constructs were identified in this study: level of involvement, push motivations, pull motivations, perceived riskiness, and desire to participate. Each construct is described below.

The level of involvement. To examine the degree of interest in orbital space tourism and the emotional responses correlated with that interest, involvement was measured by applying items adopted from McIntyre's Personal Involvement Inventory (PII) (1989) and Laurent and Kapferer's Consumer Involvement Profiles (CIP) (1985). The goal of this section is to categorize involvement of respondents into three levels: (1) Reading books/magazines; watching movies; following news from NASA; (2) Knowledge: how an orbital launch vehicle is made; familiarity with orbital space tourism product characteristics among different companies (e.g., Virgin Galactic, Space Adventure, Blue Origin, etc.); familiarity with a large deal of differences among various types of space tourism; (3) Donated, actively searched information about becoming a space tourist (e.g., search prices, health requirements, training program); and participation in activities/initiatives of NASA or other space agencies (e.g., Virgin Galactic, Space Adventure, Blue Origin and SpaceX, Lynx, XCOR, etc.). These three levels are measured by the agreement of conducting daily activities stated above. All the items are ranked on a Likert scale from "1= strongly disagree" to a "5 = strongly agree". The detailed questions are shown in Table 3-1.

Table 3-1. Participants' involvement in orbital space tourism from daily activities.

Level (1)	I am interested in reading books/magazines about space tourism. I am interested in watching TV programs/movies about space travel (e.g., The Martian, Passenger). I follow news from NASA and/or other space agencies about developments in space travel.
Level (2)	I know how an orbital launch vehicle is made. I know which companies work on making orbital tourism possible. I know a great deal about different types of space tourism. I am familiar with orbital space tourism product characteristics among the various companies (e.g., Virgin Galactic, Space Adventure, Blue Origin, etc.).

Table 3-2. Continued

Level (3)	I have actively searched for information about at least one of the following: the price of orbital space tourism, health requirements for orbital space tourism, and training programs for orbital space tourism. I have taken part in activities/initiatives of NASA and/or some other space agency or company (e.g., Virgin Galactic, Space Adventure, Blue Origin, etc.) I donated to companies who are developing orbital space tourism.

These items are adopted from "Measuring the involvement construct (Zaichkowsky, 1985)" with minor revisions.

Push motives. There are five dimensions among push motives (15 items). Three dimensions, escape, novelty, and prestige, are proposed by Crompton (1979). The last two dimensions, prestige and adventure are suggested by Zukerman (1983). The push factor items are measured by having respondents claim the importance of each item with statements interpreting their potential motivations for participating in orbital space tourism. Part of the items are from Recreation Experience Preference (REP) Scales (Driver, 1977). All the items are ranked on a Likert scale from "1=Not at all important" to a "7=Very important." Therefore, 15 push factor items are shown in Table 3-2.

Table 3-3. Push Motives.

Push motives	
Escape	Prestige
-Experience solitude	-Challenge nature
-Be alone	-Show others I can do it
-Be away from crowds of people	-Gain a sense of confidence
-Get away from the noise back home	
	Adventure
Novelty	-Take risks
-Once in a lifetime experience	-Seek out dangerous situations
-Unique experience	-Experience the uncertainty of not knowing
-Experience something new	what will happen
	Trill-seeking
	-Have a thrill
	-Experience excitement

* Crompton, J. L. (1979). Motivations for pleasure vacation. *Annals of Tourism Research*, *6*(4), 408-424.
Zuckerman, M. (1983). Sensation seeking and sports. *Personality and Individual Differences*, *4*(3), 285-292.

Pull motives. Pull motives refer to the characteristics of orbital space tourism. This study uses pull factors proposed by Reddy, Nica, and Wilkes (2012). The pull items are measured by a similar procedure to push motives'. Ten pull factor items are shown in Table 3-2. All the items are ranked on a Likert scale from "1=Not at all important" to a "7=Very important".

Table 3-4. Pull Motives.

Pull motives
Having a ride on spacecraft
Being able to view the Earth from space
See the beauty of the universe
Experience Zero-gravity
Experience high-speed acceleration
Being able to walk in space
Participating in space sports (e.g., zero-G sports centers: stadium-based sports like football; water sports; true rotating swimming pools)
Having unique accommodations in space
Participating in a training program before launch
Making a scientific contribution

* 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*(5), 1093-1102.

Perceived riskiness. The risk can either make positive and negative impacts on tourists' desire to participate (Zurick, 1995; Celsi, Rose & Leigh, 1993; Reddy, Nica & Wilkes, 2012). A rank range from "1= No risk" to "10 = Extremely high risk" is used to evaluate tourists' perception of the overall risk associated with orbital space travel.

The desire to participate. The willingness to participate in orbital space tourism without constraining factors of money and/or time. A rank measures it from "1 = Not at all enthusiastic" to "10 = Very enthusiastic."

The risks may concern. Potential tourists provide their concerns in relation to orbital space tourism via an open-ended question.

Ideal orbital space vacation. An open-ended question serves to investigate people's imagination of an ideal orbital space vacation.

Survey Flow

The survey (Appendix A) contained the following groups of items: (1) Level of Involvement; (2) Push motives and Pull motives (4) Risk Assessment and Desire to participate, and (5) Demographics. The questionnaires consisted of 11 questions comprising of Likert scale, multiple-choice, dichotomous, and open-ended questions. In the beginning, the questionnaire provides the general description of space tourism and explanation of sub-orbital and orbital space tourism. After that, there are questions examining participants' involvement in general space tourism and orbital space tourism in particular. In the Level of Involvement section, three interest groups are selected as the independent variables of this study.

Two groups of 15 push and ten pull items are used to explore travel motivations. A risk assessment rank followed the push and pull motivation. Then, respondents were asked whether they were willing to participate in orbital space tourism. Two open-ended questions are provided after Risk Assessment and Desire to participate. The respondents specified what they perceived as the most severe risk of orbital space tourism and the ideal orbital space tourism vacation by 2030.

Data Analysis

To examine the overall difference between levels of involvement in the desire to participate in orbital space tourism, an analysis of variance (ANOVA) procedure is conducted. The push and pull items are factor analyzed to define the motivation domains. Only factors with eigenvalues greater than one are preserved, and only items with loadings larger than 0.5 are contained in the final factor structure. Reliability alphas

within each dimension were computed to confirm the factor's internal consistency. The regression and Pearson's correlation coefficients are calculated to identify the degree of relationship among risk perception and desire to participate in orbital space tourism. Two open-ended questions are provided after risk assessment. Finally, regression and Pearson's correlation coefficients are calculated to identify the influencing factors of orbital travel desire. Comments on two open-ended questions are collected to determine their perceived riskiness and expected ideal orbital space vacation.

Data Collection

The chosen study design is an online survey. The anonymous link of questionnaires was distributed by UF Qualtrics to the people who are involved in activities related to space tourism, which is defined as posting and replying space tourism information on different social media platforms. An invitation letter (Appendix A) was sent to the target population.

For major social media platforms, Twitter and Facebook, comments under the posts about space tourism were selected. The questionnaire links were sent to corresponding users. The target participants were chosen by tracking the keyword "Space tourism" and #Spacetourism. The data collection received help from many Twitter users. Valerie Stimac (@Valerie_Valise) who is a freelance writer, primarily focused on travel, but was increasingly interested in space tourism topics, shared the link on Twitter (https://twitter.com/valerie_valise/status/826536676197531652) and retweeted it to her followers. Lars Pellinat (@Lars9596) also retweeted the survey link (https://twitter.com/Lars9596/status/831965449810239489). Many Twitter users think this topic is interesting and are willing to retweet it. Part of the users on Facebook also

participated in the survey. Data contribution from Facebook is less than those from Twitter.

Furthermore, survey links were distributed to 300 UF students in Department of Tourism, Recreation, and Sport Management and Department of Chemistry. Overall, about 1,000 online invitations were sent. A convenience, self-selected sample of 173 participants was recorded.

CHAPTER 4
FINDINGS

Profile of the Respondents

There are 173 responses in total. 17 people did not declare their gender, age and education background. For the rest of respondents, 50.0 percent of respondents are males, and the remaining are females. Nearly half of respondents surveyed (48.7) are between 18 to 24 years old, and one-third of those surveyed (32.7) are 25 to 34 years old. Those with master degree contribute the biggest percentage (48.7) followed by bachelor degree (32.7). Respondents (N=153) also provide their estimated average yearly household income. Nearly more than half of those surveyed (58.8 percent) gain less than $49,999 per year. Respondents with household income which is between $50,000 to $99,999 are contributing 20.9 percent (Table 4-1).

Table 4-1. The demographic profile of the respondents.

Variables	Descriptions	Frequency	Percentage
Gender	Male	78	50.0
	Female	78	50.0
Age	18-24 years old	76	48.7
	25-34 years old	51	32.7
	35-44 years old	13	8.3
	45-54 years old	10	6.4
	55 years or older	6	3.8
Education Level	Less than high school	1	.6
	High school degree or equivalent	3	1.9
	Some college but no degree	8	5.1
	Associate degree	7	4.5
	Bachelor degree	51	32.7
	Master degree	76	48.7
	Doctorate or equivalent degree	10	6.4
Income	$0-$49,999	90	58.8
	$50,000-$99,999	32	20.9
	$100,000-$149,999	19	12.4
	$150,000-$199,999	6	3.9
	$200,000 and up	6	3.9

Analysis of Levels of Involvement

The scale of this questionnaire has good internal consistency, with a Cronbach's alpha coefficient reported of 0.885. The descriptive statistics of the level of involvement are shown below in Table 4-2.

Table 4-2. The descriptive statistics of involvement level.

Items	Count Valid Percent (%)					Mean	Std. Deviation
	Strongly disagree	Disagree	Neutral	Agree	Strongly agree		
1. I am interested in reading books/magazines about space tourism.	8 4.7	17 10.1	51 30.2	62 36.7	31 18.3	3.53	1.057
2. I am interested in watching TV programs/movies about space travel (e.g., The Martian, Passenger).	3 1.8	8 4.8	32 19.0	68 40.5	57 33.9	4.02	0.930
3. I follow news from NASA and/or other space agencies about developments in space travel.	9 5.3	26 15.4	55 32.5	50 29.6	29 17.2	3.41	1.104
4. I know how an orbital launch vehicle is made.	32 19.0	59 35.1	45 26.8	22 13.1	10 6.0	2.53	1.145
5. I know which companies work on making orbital tourism possible.	26 15.5	55 32.7	37 22.0	31 18.5	19 11.3	2.78	1.259
6. I know a great deal about different types of space tourism.	25 14.8	63 37.3	45 26.6	24 14.2	12 7.1	2.64	1.137
7. I'm familiar with orbital space tourism product characteristics among the various companies (e.g., Virgin Galactic, Space Adventure, Blue Origin, etc.).	36 21.4	66 39.3	32 19.0	23 13.7	11 6.5	2.46	1.182
8. I have actively searched for information about at least one of the following: price of orbital space tourism, health requirements for orbital space tourism, and training programs for orbital space tourism.	37 21.9	49 29.0	36 21.3	34 20.1	13 7.7	2.61	1.238

Table 4-3. Continued

Items	Count Valid Percent (%) Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Mean	Std. Deviation
9. I have taken part in activities/initiatives of NASA and/or some other space agency or company (e.g., Virgin Galactic, Space Adventure, Blue Origin, etc.)	62 36.7	56 33.1	26 15.4	14 8.3	11 6.5	2.16	1.215
10. I donated to companies who are developing orbital space tourism.	77 46.1	55 32.9	23 13.8	9 5.4	3 1.8	1.82	0.958

All the scores are based on a 5-point scale. The lowest score is 11, and the highest is 49. The involvement is divided into three categories: low interest, medium interest, and high interest, respectively. The classification is based on percentile (Table 4-3).

Table 4-4. The frequency of total involvement score.

Involvement Score	Frequency	Cumulative Percent (%)	Group
…	…	…	(1) Low-interest: 1 - 22
22.00	10	24.2	
23.00	6	27.9	
…	…	…	(2) Medium-interest: 23 - 32
32.00	4	75.2	
33.00	2	76.4	
…	…	…	(3) High-interest: 33 - 49
49.00	1	100.0	

Accordingly, there are 40 participants' scores are between 1 and 22 (Low-interest). 84 respondents fall in the Medium-interest group. 41 participants are in the High-interest group. There are only two items (i1 and i2) are equal or above the total mean score (2.80) (Table 4-4). People in low-interest groups gain score beyond the average on i3 besides i1 and i2. Respondents in low-interest group are more interested in receiving information from social media compared to other activities related to space

tourism. Respondents accept information about space tourism passively in this interest group. All responses from high-interest group obtain scores more than the total average (2.80) except i10. Overall, the scores of i10 are the lowest among three levels of involvement. The individual score is shown in Table 4-5.

Table 4-5. The average score among three groups.

Items	Low Interest (N=40)	Medium Interest (N=84)	High Interest (N=41)
i1	2.80	3.42	4.49
i2	3.48	4.00	4.61
i3	2.40	3.38	4.44
i4	1.45	2.45	3.73
i5	1.58	2.69	4.15
i6	1.58	2.51	3.95
i7	1.28	2.40	3.73
i8	1.48	2.55	3.85
i9	1.30	1.92	3.49
i10	1.20	1.76	2.54
Mean	1.90	2.71	3.90

*Higher score means higher level of involvement

Table 4-6. The demographics among different levels of involvement.

Type	Classification	Low Interest (%)	Medium Interest (%)	High Interest (%)
Gender	Male	28.9	53.3	62.2
	Female	71.1	46.7	37.8
Age	18-24 years old	50.0	52.0	40.5
	25-34 years old	47.4	32.0	16.2
	35-44 years old	2.6	9.3	13.5
	45-54 years old	0.0	4.0	18.9
	55 years or older	0.0	2.7	10.8
Education Level	Less than high school	2.6	0.0	0.0
	High school degree or equivalent	0.0	1.3	5.4
	Some college but no degree	5.3	4.0	5.4
	Associate degree	0.0	2.7	10.8
	Bachelor degree	36.8	29.3	35.1
	Master degree	52.6	52.0	40.5
	Doctorate or equivalent degree	2.6	10.7	2.7
Income	$0-$49,999	71.1	61.6	45.7
	$50,000-$99,999	13.2	24.7	17.1
	$100,000-$149,999	10.5	8.2	22.9
	$150,000-$199,999	5.3	4.1	2.9
	$200,000 and up	0.0	1.4	11.4

A One-way between-groups analysis of variance (ANOVA) is conducted to explore whether the involvement level has an impact on the desire to participate in orbital space tourism. The independent variable represents the three different involvement groups: (1) low-interest group, (2) medium-interest group, and (3) high-interest group. The dependent variable, the desire to participate in orbital space tourism which is rated on a scale of 1-10. Its means and standard deviations are shown in Table 4-6.

Table 4-7. Means and standard deviations of desire to participate.

Involvement groups	N	Mean	Std. Deviation
Low-interest	37	6.62	2.63
Medium-interest	72	7.36	2.42
High-interest	34	8.41	2.28
Total	143	7.42	2.51

The test of homogeneity of variance is significant (Table 4-7), Levene's $F(2,140) = 1.25$, $p = .291$, indicating that it does not violate the homogeneity of variance assumption. A significant level of .05 is used for following analyses. An analysis of variance (Table 4-8) reveals that there is a significant difference at the $p<0.05$ level in involvement scores for the three groups: $F(2,140) = 4.80$, $p = .010$, and the actual difference in average scores between the groups was quite big. The effect size which is 0.05 indicates that about 5% of the variation in the desire to participate is attributed to differences between the three groups of involvement level.

Table 4-8. The test of homogeneity of variance.

Levene Statistic	df1	df2	Sig.
1.246	2	140	.291

Table 4-9. Analysis of variance for desire to participate by involvement groups.

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	57.28	2	28.64	4.80	.010
Within Groups	835.55	140	5.97		
Total	892.83	142			

Post-hoc comparisons using the Tukey HSD test indicates different from Low interest group (M = 6.62, SD = 2.63) differ significantly from High interest group (M = 8.41, SD = 2.28). The results are given in Table 4-9 and reveal that respondents in the high-interest group are more willing to participate in orbital space tourism than respondents in the low-interest group. The effect size for this significant pairwise difference is 0.73.

Table 4-10. Post Hoc results for desire to participate by involvement groups.

Involvement group	Mean	Mean Differences (I-J) (Effect size are indicated in parentheses)		
		1 (J)	2 (J)	3 (J)
1. Low interest (I)	6.62	--		
2. Medium interest (I)	7.36	0.74	--	
3. High interest (I)	8.41	1.79* (0.73)	1.05	--

*. The mean difference is significant at the 0.05 level.

Analysis of Push and Pull Motivation

The average scores of push and pull motives are ranked in Table 4-10 and 4-11, respectively. In Table 4-10, four items recorded mean values above five while ten items are placed between the ranges of 3.06 to 4.98. The statement “Unique experience” recorded the highest mean value of 6.26, while statement on “Be alone” scored the lowest mean value (3.06). In Table 4-11, item “Seeing the beauty of the universe” obtained the highest mean value of 6.38. “Being able to view the Earth from space,”

“Experiencing Zero-gravity,” “Having a ride on spacecraft” and “Being able to walk in space” are also considered significant pull motives as they obtained high mean values. “Participating in space sports,” “Experiencing high-speed acceleration” and “Making a scientific contribution” are placed at the lower range.

Table 4-11. Mean values of push motive items.

Statement	N	Mean	SD
- Unique experience	167	6.26	1.256
- Once in a lifetime experience	167	6.22	1.327
- Experience something new	166	6.22	1.217
- Experience excitement	167	5.55	1.645
- Challenge nature	166	4.98	1.955
- Have a thrill	167	4.52	1.846
- Experience solitude	166	4.20	2.153
- Gain a sense of confidence	166	4.13	2.138
- Show others I can do it	165	4.06	2.103
- Take risks	167	3.96	2.087
- Experience the uncertainty of not knowing what will happen	167	3.83	1.919
- Get away from the noise back home	167	3.48	1.923
- Be away from crowds of people	168	3.35	1.880
- Seek out dangerous situations	167	3.28	2.014
- Be alone	168	3.06	1.830

Table 4-12. Mean values of pull motive items.

Statement	N	Mean	SD
- Seeing the beauty of the universe	160	6.38	1.164
- Being able to view the Earth from space	160	6.23	1.373
- Experiencing Zero-gravity	160	5.90	1.539
- Having a ride on spacecraft	159	5.77	1.440
- Being able to walk in space	159	5.74	1.556
- Having unique accommodations in space	159	5.18	1.513
- Participating in a training program before launch	160	5.16	1.644
- Making a scientific contribution	160	5.02	1.829
- Participating in space sports (e.g., zero-G sports centers: stadium-based sports like football; water sports; rotating swimming pools)	160	4.76	1.879
- Experiencing high-speed acceleration	160	4.94	1.869

To verify the suitability of the dataset for factor analysis, the following steps are taken: Kaiser - Meyer - Olkin Measure of Sampling Adequacy (KMO) value is found to be sufficiently high for all the variables. The KMO computed is reported of 0.776 for push motives and 0.782 for pull motives. The score indicates that the sample is good enough for sampling.

The overall significance of correlation matrices is tested with Barlett's Test of Sphericity (approximate chi-square = 1333.809, df= 105.000 and significant at 0.000) for push motives and (approximate chi-square = 591.375, df= 45.000 and significant at 0.000) for pull motives. It provided as well to support the validity of the factor analysis of the data set, as it indicates adequate intercorrelations between the items which allow the use of factor analysis.

To identify motivational dimensions, principal component factor analysis is employed for extracting factors. Four push motivational factors are analyzed using Varimax Rotation procedure to delineate the underlying dimensions associated with travel motivation. The same procedure was also applied to 10 pull motive items. All factors have Eigenvalue exceeding 1. The Table 4-12 reports that the factor analysis of 15 push motives resulted in four factors groups of "Novelty," "Trill-seeking and Adventure," "Escape" and "Prestige." Novelty is the most important push factor with an Eigenvalue of 4.732 followed by trill-taking and adventure with an Eigenvalue of 3.028. The percentage of total variance is used as an index to determine how well the total factor solutions account for 71.677 of the total variations for push motives and 65.854 for pull motives. The composite reliability test indicated that the for push motives' reliability coefficient is 0.835 and pull motives' is 0.826, respectively.

Table 4-13. Principal Components of push motives.

Factors	Components				
	1	2	3	4	Communality
- Unique experience	0.912				0.854
- Experience something new	0.884				0.807
- Once in a lifetime experience	0.854				0.755
- Have a thrill		0.836			0.753
- Take risks		0.736			0.740
- Seek out dangerous situations		0.671			0.763
- Experience the uncertainty of not knowing what will happen		0.622			0.657

Table 4-14. Continued

Factors	Components				
	1	2	3	4	Communality
- Experience excitement	0.553	0.606			0.685
- Be alone			0.848		0.737
- Get away from the noise back home			0.843		0.782
- Be away from crowds of people			0.834		0.710
Eigen value	4.732	3.028	1.909	1.083	
% of variance	31.548	20.184	12.725	7.221	
Cummulative%	31.548	51.731	64.456	71.677	
Cronbach's alpha	0.634	0.325	0.628	0.363	
KMO	0.776				

Rotation Method: Varimax with Kaiser Normalization. a. Rotation converged in 7 iterations.

Item "Having unique accommodations in space" is due to the Cronbach's alpha increasing (.689) if it deleted. The Table 4-13 shows that the factor analysis of 9 pull motives resulted in three factors groupings of "Beauty and excitement," "Adventure and activities," and "Scientific contribution." "Beauty and excitement" is the most important pull factor with an Eigenvalue of 3.718 followed by "Adventure and activities" with an Eigenvalue of 1.500 and Scientific contribution with an Eigenvalue of 1.003. The total factor solutions account for 69.129 for pull motives.

Table 4-15. Principal Components of Pull Motive Items.

Factors	Components			
	1	2	3	Communality
- Being able to view the Earth from space	0.921			0.873
- Seeing the beauty of the universe	0.896			0.834
- Having a ride on spacecraft	0.687			0.645
- Experiencing high-speed acceleration		0.829		0.697
- Being able to walk in space		0.673		0.545
- Experiencing Zero-gravity		0.669		0.679
- Participating in space sports (e.g., zero-G sports centers: stadium-based sports like football; water sports; rotating swimming pools)		0.574		0.455
- Making a scientific contribution			0.876	0.783
- Participating in a training program before launch			0.791	0.711
Eigen value	3.718	1.500	1.003	
% of variance	41.316	16.668	11.144	
Cummulative%	41.316	57.985	69.129	
Cronach's alpha	0.597	0.337	0.637	
KMO	0.782			

Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 5 iterations.

The Influencing Factors to Desire to Participate

Correlation and multiple regression analyses are conducted to explore the relationship between desire to participate and different influencing factors. The relationship between desire to take part in orbital space tourism, perceived riskiness, the level of involvement, push motivation, and pull motivation is investigated using Pearson correlation coefficient (Table 4-14). Preliminary analyses are performed to ensure no violation of the assumptions of normality, linearity, and homoscedasticity. As can be seen, some of the variables are positively and significantly correlated with the desire to participate, indicating that there is a medium positive association both push factor 1 and pull factor 1, r(166) = .307; r (159) = .397, at 0.01 significant level. Those with higher scores on these variables tend to have higher scores in the desire to participate.

Table 4-16. Correlations between each variable.

Variable	Pearson's r
Desire to participate	
Perceived riskiness	-.147
Push1 Novelty	.307**
Push2 Trill-seeking and Adventure	.289**
Push3 Escape	.094
Push4 Prestige	.251**
Pull1 Beauty and excitement	.397**
Pull2 Adventure and activities	.276**
Pull3 Scientific contribution	.155

**. Correlation is significant at the 0.01 level (2-tailed).

Table 4-15 summarizes the descriptive statistics and analysis results. The multiple regression model with all eight predictors produced $R^2 = .243$, $F(8, 136) = 5.46$, $p < .001$., indicating these factors explain 24.3% of total variability in desire to participate. As can be seen in the table, the perceived riskiness scale has a significant

negative weight, indicating that after accounting for scores of other variables, those respondents with higher perceived riskiness scores are expected to have lower intention to participate in orbital space tourism. The “Beauty and excitement” scale has significant positive regression weights, indicating respondents with higher scores on this scale are expected to have higher intention to participate in orbital space tourism, after controlling for the other variables in the model. Push factor “Novelty,” “Trill-seeking and Adventure,” “Escape” and “Prestige” and pull factor “Adventure and activities,” and “Scientific Contribution” does not significantly contribute to the multiple regression model.

Table 4-17. Summary statistics, and results from the regression analysis.

			Regression weights		
Variable	Mean	SD	B	β	t
Desire to participate	7.44	2.51			
Perceived riskiness	6.74	2.09	-.178*	-.148	-1.971
Push1 Novelty	6.23	1.15	.281	.129	1.481
Push2 Trill-seeking and Adventure	4.23	1.50	.296	.176	1.790
Push3 Escape	3.55	1.53	.070	.043	.524
Push4 Prestige	4.39	1.71	.058	.040	.399
Pull1 Beauty and excitement	6.12	1.15	.663**	.304	3.268
Pull2 Adventure and activities	5.33	1.27	.001	.000	.003
Pull3 Scientific contribution	5.09	1.52	-.044	-.027	-.305

* P < 0.05
** P < 0.01

Risk Perception and Ideal Orbital Space Vacation

Respondents provide a variety risks they are concerned. There are eight major perspectives: accident, health, aerospace environment, mental issues, ride, connection, time, and extraterrestrial. Additionally, “death” is mentioned 13 times when respondents perceive the potential riskiness. “Safety” is mentioned 8 times. The detailed interpretation can be seen in Table 4-16.

Table 4-18. Detailed perceived risks.

Risk may concern	Description
Accident	Vehicle failure; Mechanical failure; Failure during take-off or re-entry Cabin Depressurization; Landing failure; Malfunction of technology Loss of Life, by Fire, Impact, Suffocation, Explosion;
Health	Death; Bone and muscle loss; Cancer or blood disease due to radiation in space; Getting nauseous, sick, scared, panic; Some unknown physical conditions that worsen during acceleration;
Aerospace environment	Cosmic and solar radiation; Thin Oxygen and vacuum; Gravity loss; Orbital debris/space trash;
Mental issues	Not enough bravery; Cannot come back to home; Uncertainty;
Ride	High-speed acceleration; G-forces;
Connection	Losing of control from ground; Losing connection in the space; Isolation from immediate help;
Time	Loss of time; Takes away time from doing important things on Earth (career, family, etc.);
Extraterrestrial	Alien; May raise attention from other intelligence being in the universe.

The comments of question 5 showcase the diverse imagination of ideal orbital space vacation and some respondents even envision a particular vacation package.

There are six aspects respondents mentioned: overall image, duration, amenities, activities, accompanies and future destination, respectively. See detailed descriptions in Table 4-17. Respondents also comment like “it’s still a game for rich people.” and “I don’t plan to do so.” besides envisioning ideal orbital space vacation.

Table 4-19. Descriptions of ideal orbital space vacation.

	Description
Overall image	Safe and affordable; Amazing and awesome; Unique and fantastic; Easy and comfortable; Relaxing, exciting and novel; Money consuming and might be risky in traveling/training but excited; Not very popular;
Duration	2-3 days; A few days; One week; A month; As long as possible;
Amenities	Professional preorbital flight training, orbital flight, and postorbital evaluation; Large windows on spacecraft; Nice accommodation and delicious food; Cool accommodation like in the Disney movie, Zenon; Like a large superyacht, touring around the planets with luxurious accommodations and beautiful views; Wi-Fi;
Accompanies	Small groups including few families at a time on a craft; Be with a group of friends and peers in the tourism industry; Professionals;
Future destination	Moon; Mars; Saturn’s moons.

Table 4-20. Continued

	Description
	See Earth from space; Spacewalk, zero gravity sports and athletic spaces including giant wheel for jogging with micro-gravity or possibility entire station uses centripetal force; Playing weightless games; A single orbit around the earth that includes several minutes of extravehicular activity;
Activities	Visit an orbital facility; An orbit around earth; Assisting with testing of untried systems yet to be introduced, observation of Earth weather/pollution; Experience what astronauts do; See the sun rise and set in space and a long time in weightless environment; Take pictures of earth/universe

CHAPTER 5
DISCUSSION

This study aims to understand factors influencing potential tourists' desire to participate in orbital space tourism by considering the following variables: the level of interest in involvement, push and pull motivations, and perceived riskiness of space travel.

As the measure of the participants' degree of interest, the level of involvement was first analyzed. The results of involvement analysis show that the higher the level of interest, the more activities participants took. For individuals in the medium and high-interest groups, they are more active in seeking information and mastering knowledge about space tourism. Compared to the other participants, participants in the high-interest group know much more about current orbital space tourism companies and different types of space tourism. This study found that respondents in the high-interest group are more willing to participate in orbital space tourism than respondents in the low-interest group.

With respect to push motivation, the results of factor analysis suggest that the needs for novelty (factor Novelty) and trill-seeking (factor thrill-seeking and adventure) are the most significant push motivations which stimulate the desire to participate (Table 4-12). This evidence is consistent with Yuan and McDonald's argument that Novelty is the most important motivation factor (1990). Many researchers (Farley, 1991; Lee & Crompton, 1992; Celsi et al., 1993; Ray, 2003) conducted studies on the motivation for participating in extreme sports, for example, skydiving, rock climbing, and parachuting. They suggested that the novelty of the activity, its risky nature, and the level of proficiency required to be unharmed while performing the activity are all powerful

motivators for the people with high tolerance to risk. This study points out to the similarity of push motivation between extreme sports and orbital space tourism: people are seeking novel experience and adventure (Zukerman, 1983).

With respect to pull motivation, the factor analysis reveals three aspects of pull motivations, "beauty and excitement," "adventure and activities," and "scientific contribution" as the most influential pull factors affecting the desire to participate in orbital space tourism (Table 4-13). Barret suggests "viewing earth from the space" is the most decisive motive of space travel (1999). Toyohiro Akiyama (1993), a Japanese reporter and civil astronaut asserts that "sightseeing the Earth is very special the feeling is more than just seeing the beauty, it is a psychological experience." These results also correspond to Reddy, Nica and Wilkes' finding: "vision of Earth from space" and "unusual experience," are the essential perceptions for space tourists (2012). In addition, this study found that "having a ride on spacecraft" and "participating in a training program before launch" are also significant motives for potential space tourists (Table 4-13).

Pull motivations are the extrinsic motives to engage in a tourism activity. Pull factors influence the tourist's decision of which specific destination will eventually be selected (Crompton, 1979). To orbital space tourism extent, this study indicates that pull motivations are decisive factors for potential tourists' desire to participate. From the results of regression analysis, there is a significant positive relationship between pull factor 1 (Beauty and Excitement) and the desire to participate (Table 4-15). Orbital space tourism destination is different from the traditional travel destination on Earth, providing unique sightseeing like viewing Earth from space. The experience offered by

orbital space tourism is irreplaceable. Therefore, pull motivation played a more important role in orbital space tourists' desire for travel (Table 4-15).

Perceived riskiness, in particular, has to be taken into consideration when explaining tourists' desire for orbital space travel. 60.9% of participants got 7 scores and above in perceived riskiness scale. That is to say, most of the people recognize orbital space travel as a quite risky activity. They perceived several serious types of risk such as accidents (Mechanical failure, landing failure, and loss of life, by fire, impact, suffocation, and explosion), health issues (Bone and muscle loss, cancer or blood disease due to radiation in space) and hazard aerospace environment (Cosmic radiation, space debris) (Table 4-16). However, compared to the fatality between skydivers and astronauts, space travel is not that risky as people perceived. From all countries together by the USA, 553 astronauts taking flights that exceed an altitude of 100 kilometers (62 mi) were sent to space based on Fédération Aéronautique Internationale (FAI - The World Air Sports Federation) Sporting Code (FAI, 2012). As of 2017, there have been 18 astronaut and cosmonaut fatalities during spaceflight, or 0.0033 death per 1,000 astronauts (Harwood, W., 2005). The risk takes on a whole new perspective when compared to the safety record of skydiving. Fatalities associated with some extreme sports were higher than those of traveling to space. According to the United States Parachute Association Statistics (2006 - 2015) of an estimated 2.97 million jumps per year, there were 21.9 average fatalities, or 0.0075 average deaths per 1,000 jumps (USPA, 2015).

NASA has launched 132 manned shuttle in the past. It has lost two shuttles: Space Shuttle Challenger (January 28, 1986) and Space Shuttle Columbia (February 1,

2003). Russia's Soyuz program has a comparable failure rate. Soyuz has not had a fatality in almost 40 years, but there are two fatal accidents in over 100 manned missions: Soyuz 1 parachute failure (April 24, 1967) and Soyuz 11 decompression (June 30, 1971). These spaceflight related accidents amplify the idea that sending people to space is an inherently risky endeavor. Actually, Bryan O'Conner, head of NASA's Safety and Mission Assurance Office, said "the shuttle and Soyuz risks are thus in the same ballpark as the chances of dying while trying to climb Mount Everest. From 1922 to 2006, one out of every 49 people who undertook the climb ended up dying" (Wall, M., 2011).

People consider that space travel can be risky. The perception of high risk hinders potential tourists' travel motivation (Table 4-15). This study selected participants who are aware of the idea of space tourism. Books/magazines, movie and the news media provided accessible ways for potential tourists to understand space tourism. So, explaining and convincing future orbital space tourists is a huge challenge for industry practitioners. Practitioners may enhance the accessibility of space tourism information. They would better to display statistics and describe how the process works and make tourists gain a sense of security. The orbital space tourism companies have to ensure passengers the safety.

Based on the motivation analysis, this study proposes that the intrinsic need of "Novelty" contributes in motivating people to participate in orbital space tourism. People long for a unique experience. They desire for experiencing something new. Orbital space tourism should promote that it is a once in a lifetime experience to draw potential orbital tourists' attention. This study also reveals that the unique characteristics of

orbital space tourism significantly attract potential orbital space tourists. Practitioners should focus on unique sightseeing attractions combined with new exciting activities such as walking in space and various space sports. Also, the training program is a good way to get potential space tourists involved, allowing tourists to understand the risks objectively.

CHAPTER 6
LIMITATION AND FUTURE RESEARCH

This study made two assumptions which may be considered as limitations and, therefore, if not correct, affect the validity of results. One assumption is concerned with the fact that the population of future orbital space tourists is not known at present. This study assumed that this population consists of people who are younger than general population, are interested in travel in general, and have some knowledge of issues related to space exploration. One of the research questions was to compare people with different level of interest in space travel (involvement variable) on their desire for orbital space tourism; therefore, respondents with different level of interest in space travel, had to be reached. The second assumption was that participants at the Internet space forums were likely to have relatively high level of involvement; therefore, the student sample was added to have enough people which involvement was comparatively low. However, it was not possible to verify the correctness of the second assumption, since participants replied to the survey via a link that did not distinguish the origin of the invitation. In other words, the connection between the invitation mode (social media or university emails) and the reply could not be establishedIn addition, the participants may not provide accurate demographic information. The form of the online survey means there is no interviewer to help participants to clarify the questions. It may lead to less reliable data.

The convenience sample is unlikely to be representative of the population being studied. The users of Twitter and Facebook and students can not represent all those who are interested in orbital space tourism. Future space tourists were presumed to be younger. In fact, 18.5% of respondents are over 34 years old. The results from this

sample may differ significantly with the results from the entire population, making it hard to generalize findings from sample to the entire population. The convenience sample may have impacted the external validity of this study. Future researchers need to consider adopt a more rigorous and reliable sampling method.

Before it can be determined if a new industry sector of orbital space tourism can be an everyday affair, more socio-demographic features are needed to understand the impacts on the travel intention. This study indicated that men seem to have higher interest than women; the willingness to participate in orbital space tourism differs according to the respondents' gender as follows: 66.7% males and 41.9% females rate the desire for travel at 8 and above (on a scale of a 10 point rank). These results support the assumption that space is traditionally a male-dominated realm (Barrett, O., 1999). Hence, future research could survey more people to discover the relationship between demographic features and the desire for travel.

Motivations for orbital space tourism can be further examined by a comparative study of different types of space tourism or can focus on the type of target population like adventure tourists, extreme sport tourists, etc. Further researchers also need to concentrate on the various risk types like risks related to health issues, spacecraft and aerospace environment which are also critical in predicting tourists' desire for orbital space travel. Comparative studies may reveal a new understanding of potential orbital tourists' desire in different domains and more risks tourists may concern. Furthermore, only two open-ended questions were included in the survey to explore the risk perceptions and visions of an ideal orbital vacation. The future researcher may consider

generating a qualitative method to understand potential tourists' thoughts about risks, motivations, and expectations better.

The real affordability is still considered a crucial aspect of travel motivation study. Therefore, efforts should be made in future to survey wealthy population who could actually afford the hefty price of an orbital space trip. Their perceptions and willingness to participate in orbital space tourism are beneficial to orbital space tourism development. Understanding what potential tourists desire will, therefore, be a major factor to success.

APPENDIX
QUESTIONNAIRE OF ORBITAL SPACE TOURISM SURVEY 2017

Orbital Space Tourism Survey 2017

University of Florida, Dept. of Tourism, Recreation and Sport Management

Dear Participant,

After years of promises, orbital space tourism is finally taking off from pages of science fiction books and landing in reality! Seven people have already participated in orbital space tourism by taking a vacation 330 to 435 km (205 to 270 mi) from Earth. Technical progress is in works to make orbital space tourism affordable for a larger number of people and space tourism industry is forecast to contribute to the educational and economic wellbeing of people.

This study investigates motivations of people to become orbital space tourists and risks that they associate with traveling to space. Moreover, we need help from people like you! Please consider participating in our "Orbital Space Tourism" survey which will take approximately 10 minutes of your time.

The results will be reported in aggregates only, and the findings will never discuss individual responses. The survey is anonymous: we have no means to link individual responses to people who provided them. However, whenever one works with email/the Internet, there is always the risk of compromising privacy, confidentiality, and/or anonymity. Despite this possibility, risks to your physical, emotional, social, professional, or financial well-being are considered to be minimal. There may not be any direct benefit to you from participating this survey. The researchers, however, may learn more about knowledge to orbital space tourism, and society may benefit from this survey.

Your participation is voluntary, and you can discontinue the survey at any time. We greatly appreciate your participation and input. If you have questions or comments about this survey, please contact Luyu Wang (luyuw.93@ufl.edu) or Svetlana Stepchenkova (svetlana.step@ufl.edu) at (352 294 1652). We can also be reached through the Department of Recreation, Parks and Sport Management at the University of Florida. For information regarding your rights as a research participant, please contact the UF IRB-02 office at 352-392-0433 or irb2@ufl.edu.

Thank you for your help,

Luyu Wang, Master student (luyuw.93@ufl.edu)
Svetlana Stepchenkova, Ph.D., Associate Professor (svetlana.step@ufl.edu)
Dept. of Tourism, Recreation and Sport Management
College of Health and Human Performance
University of Florida

By clicking on the “Next” button you confirm that you are 18 years old or older.

Space tourism, orbital or sub-orbital, is space travel for recreational, leisure, or business purposes. In a sub-orbital flight, a spacecraft reaches 100 km (62 mi) above the sea level and then goes back to Earth, without completing even one full revolution around the Earth. The passengers will experience weightlessness for only a few minutes.

In **orbital** space travel, a spacecraft makes at least one full revolution around the Earth. The weightlessness period is much longer as compared to the sub-orbital flights. Currently, orbital trips use Soyuz Spacecraft to bring travelers to the International Space Station. This survey focuses on **orbital** space tourism.

Section A: Level of Involvement

1. Please tell us how interested you are in space tourism in general and orbital space tourism in particular. Answer the questions below using the provided scale:

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
I am interested in reading books/magazines about space tourism.					
I am interested in watching TV programs/movies about space tourism (e.g., The Martian, Passenger).					
I follow news from NASA and/or other space agencies about developments in space travel.					
I know how an orbital launch vehicle is made.					
I know which companies work on making orbital tourism possible.					
I know a great deal about different types of space tourism.					
I’m familiar with orbital space tourism product characteristics among the various companies (e.g., Virgin Galactic, Space Adventure, Blue Origin, etc.).					
I have actively searched for information about at least one of the following: price of orbital space tourism, health requirements for orbital space tourism, and training programs for orbital space tourism.					
I have taken part in activities/initiatives of NASA and/or some other space agency or company (e.g., Virgin Galactic, Space Adventure, Blue Origin, etc.)					
I donated to companies who are developing orbital space tourism.					

Section B: Push and pull motives

2. Think of yourself as a potential orbital space tourist. What would motivate you the most to go to space? Rank each motive below from 1 (Not at all important) to 7 (Very Important).

	Not at all important	*	*	Neutral	*	*	Very important
Experience solitude							
Be alone							
Be away from crowds of people							
Get away from the noise back home							
Once in a lifetime experience							
Unique experience							
Experience something new							
Challenge nature							
Show others I can do it							
Gain a sense of confidence							
Take risks							
Seek out dangerous situations							
Experience the uncertainty of not knowing what will happen							
Have a thrill							
Experience excitement							

3. Orbital space travel provides many unique experiences. Some of them are listed below. How important are these experiences to you as a potential space tourist? Rate each experience on a scale from 1 (Not at all important) to 7 (Very important).

	Not at all important	*	*	Neutral	*	*	Very important
Having a ride on spacecraft							
Being able to view the Earth from space							
Seeing the beauty of the universe							
Experiencing Zero-gravity							
Experiencing high-speed acceleration							
Being able to walk in space							
Participating in space sports (e.g., zero-G sports centers: stadium-based sports like football; water sports; rotating swimming pools)							
Having unique accommodations in space							
Participating in a training program before launch							
Making a scientific contribution							

Section C: Risk assessment and desire to participate in orbital space tourism

Imagine yourself an orbital space tourist. Your trip is likely to involve spending about a week at the International Space Station. To get there you will experience the spacecraft's take-off and re-entry.

4. Orbital space tourism is relatively new and involves a number of risks associated with the technical and human health aspects of travel. How would you rate the overall risk related to orbital space travel? Use a scale below, where 1 = No risk and 10 = Extremely high risk.

No risk — Extremely high risk

● ● ● ● ● ● ● ● ● ●

5. Think about orbital space travel without constraining factors of money and/or time. Rate your enthusiasm to become an orbital space tourist from 1 = Not at all enthusiastic to 10 = Very enthusiastic.

Not at all enthusiastic — Very enthusiastic

● ● ● ● ● ● ● ● ● ●

6. What is the most serious risk of orbital space tourism for you personally?

7. Imagine orbital space tourism which you think will be possible by 2030. Please share with us how you envision your ideal orbital tourism vacation.

Section D: Demographics

8. Please indicate your gender?

- Male
- Female

9. What is your age?

- 18-24 years old
- 25-34 years old
- 35-44 years old
- 45-54 years old
- 55 years or older

10. What is the highest level of school you have completed or the highest degree you have received?

- Less than high school degree
- High school degree or equivalent (e.g., GED)

- Some college but no degree
- Associate degree
- Bachelor degree
- Master degree
- Doctorate or equivalent degree
- Postdoctorate

11. What is your approximate yearly average household income?

- $0-$49,999
- $50,000-$99,999
- $100,000-$149,999
- $150,000-$199,999
- $200,000 and up

THANK YOU SO MUCH FOR TAKING THE TIME AND EFFORT TO COMPLETE THIS SURVEY!
Your help with this project is greatly appreciated!

LIST OF REFERENCES

Abitzsch, S. (1996). Prospects of space tourism. Dglr Bericht, 99-112.

Akiyama, H., Barger, S., Barnum, S., Bradt, B., Bauer, J., Cole, G. M., ... & Finch, C. E. (2000). Inflammation and Alzheimer's disease. Neurobiology of aging, 21(3), 383-421.

Akiyama, T. (1993). The pleasure of spaceflight. The Journal of Space Technology and Science, 9(1), 1_21-1_23.

Baniya, R., & Paudel, K. (2016). An Analysis of Push and Pull Travel Motivations of Domestic Tourists in Nepal.

Barrett, O. (1999). An evaluation of the potential demand for space tourism within the United Kingdom., from http://www.spacefuture.com/archive/an_evaluation_of_the_potential_demand_for_space_tourism_within_the_united_kingdom.shtml. Retrieved November 7, 2016.

Bensoussan, D. (2010). Space tourism risks: A space insurance perspective. Acta Astronautica, 66(11), 1633-1638.

Buckey, J. C. (2006). Space physiology. Oxford University Press, USA.

Buckley, R. (2012). Rush as a key motivation in skilled adventure tourism: Resolving the risk recreation paradox. Tourism Management, 33(4), 961-970.

Carrier For Tourist Spaceship Unveiled. Retrieved November 7, 2016, from http://www.cbsnews.com/news/carrier-for-tourist-spaceship-unveiled/

Celsi, R. L. (1992). Transcendent benefits of high-risk sports. NA-Advances in Consumer Research Volume 19.

Celsi, R. L., Rose, R. L., & Leigh, T. W. (1993). An exploration of high-risk leisure consumption through skydiving. Journal of consumer research, 20(1), 1-23.

Chang, Y. W. (2015). The first decade of commercial space tourism. Acta Astronautica, 108, 79-91.

Chindarath, P., Hernandez, A., Hoyler, B., Manning, R., & Phuriphanvichai, M. Paper 9 Space Tourism. In Financing Technology Innovation (p. 86). GBI Books. Retrieved November 1, 2016, from Google Book.

Chon, K. S. (1989). Understanding recreational traveler's motivation, attitude and satisfaction. The Tourist Review, 44(1), 3-7.

Civilian Space Stations and the U.S. Future in Space (Washington, DC: U.S. Congress, Office of Technology Assessment, OTA-STI-241, November 1984).

Cole, S. (2015). Space tourism: prospects, positioning, and planning. Journal of Tourism Futures, 1(2), 131-140.

Collins, P. (2014), “Renaissance Italia”, held at the Politecnico di Milano, Campus Bovisa, May 8-9.

Collins, P. Q., & Ashford, D. M. (1988). Potential economic implications of the development of space tourism. Acta Astronautica, 17(4), 421-431.

Collins, P., & Autino, A. (2010). What the growth of a space tourism industry could contribute to employment, economic growth, environmental protection, education, culture and world peace. Acta Astronautica, 66(11), 1553-1562.

Collins, P., Stockmans, R., & Maita, M. (1995). Demand for space tourism in America and Japan, and its implications for future space activities. Sixth International Conference of Pacific-Basin Societies, Marina del Rey, California. Advances in the Astronautical Sciences, 91,601- 610.

Crompton, J. L. (1979). Motivations for pleasure vacation. Annals of Tourism Research, 6(4), 408-424.

Dann, G. M. (1977). Anomie, ego-enhancement and tourism. Annals of tourism research, 4(4), 184-194.

David, L. (2004, September 22). Zero G Flights Could Bolster Space Tourism, Research Industries. Retrieved August 28, 2016, from http://www.space.com/355-flights-bolster-space-tourism-research-industries.html

Driver, B. L. (1977). Item pool for scales designed to quantify the psychological outcomes desired and expected from recreation participation. Unpublished paper. USDA Forest Service, Rocky Mountain Forest and Range Experiment Station, Fort Collins, CO.

Fédération Aéronautique Internationale. (2012, May 22). Sporting Code Section 8: Astronautic Records. Retrieved May 16, 2017, from http://www.fai.org/fai-documents

Future of Space Tourism: Who's Offering What. Retrieved November 5, 2016, from http://www.space.com/11477-space-tourism-options-private-spaceships.html

Gebhardt, C. (2016, May 22). India successfully launches Reusable Launch Vehicle demonstrator mission. Retrieved November 01, 2016, from https://www.nasaspaceflight.com/2016/05/india-launch-reusable-launch-vehicle-demonstrator-mission/

Gursoy, D., & Gavcar, E. (2003). International leisure tourists' involvement profile. Annals of tourism research, 30(4), 906-926.

Gyimóthy, S., & Mykletun, R. J. (2004). Play in adventure tourism: The case of Arctic trekking. Annals of Tourism Research, 31(4), 855-878.

Harwood, W. (2005, May 23). Astronaut Fatalities. Retrieved May 16, 2017, from https://spaceflightnow.com/shuttle/sts114/fdf/fatalities.html

Havitz, M. E., & Howard, D. R. (1995). How enduring is enduring involvement? A seasonal examination of three recreational activities. Journal of Consumer Psychology, 4(3), 255-276.

Howard, D. (2005). Making Space Happen: Private Space Ventures and The Visionaries Behind Them by Paula Berinstein. Journal of Space Law, 31(2), 459.

Huberman, J. (1968). Psychological study of participants in high-risk sports(Doctoral dissertation, University of British Columbia).

Hwang, S. N., Lee, C., & Chen, H. J. (2005). The relationship among tourists' involvement, place attachment and interpretation satisfaction in Taiwan's national parks. Tourism Management, 26(2), 143-156.

Iso-Ahola, S. E. (1982). Toward a social psychological theory of tourism motivation: A rejoinder. Annals of tourism research, 9(2), 256-262.

Josiam, B. M., Smeaton, G., & Clements, C. J. (1999). Involvement: Travel motivation and destination selection. Journal of Vacation Marketing, 5(2), 167-175.

Kanagaraj, C., & Bindu, T. (2013). An analysis of push and pull travel motivations of domestic tourists to Kerala. International Journal of Management & Business Studies, 3(2), 112-118.

Kim, K. (2008). Analysis of structural equation model for the student pleasure travel market: Motivation, involvement, satisfaction, and destination loyalty. Journal of Travel & Tourism Marketing, 24(4), 297-313.

Kim, S. S., Lee, C. K., & Klenosky, D. B. (2003). The influence of push and pull factors at Korean national parks. Tourism management, 24(2), 169-180.

Laing, J., Crouch, G. I., & Singh, T. V. (2004). Vacationing in space: tourism seeks' new skies'. New horizons in tourism: Strange experiences and stranger practices, 11-25.

Langer, G. (2008, February 08). Poll: Four in 10 Would Fly in Space; Just Knock $198,000 Off the Ticket. Retrieved November 01, 2016, from http://abcnews.go.com/PollingUnit/story?id=4255841

Laurent, G., & Kapferer, J. N. (1985). Measuring consumer involvement profiles. Journal of Marketing Research, 41-53.

Lee, T. H., & Crompton, J. (1992). Measuring novelty seeking in tourism. Annals of Tourism Research, 19(4), 732-751.

Loizou, J. (2006). Turning space tourism into commercial reality. Space Policy, 22(4), 289-290.

Manfredo, M. J. (1989). An investigation of the basis for external information search in recreation and tourism. Leisure Sciences, 11(1), 29-45.

Maslow, A. H. (1943). A theory of human motivation. Psychological review,50(4), 370.

Meteorides (discussing space tourism). Retrieved November 5, 2016, from http://www.meteorides.com/

National Air and Space Museum. Retrieved November 1, 2016, from https://en.wikipedia.org/wiki/National_Air_and_Space_Museum

Newsroom | Kennedy Space Center Visitor Complex. Retrieved November 1, 2016, from http://media.kennedyspacecenter.com/

Pearce, P. L. (1982). Perceived changes in holiday destinations. Annals of Tourism Research, 9(2), 145-164.

Pearce, P. L., & Caltabiano, M. L. (1983). Inferring travel motivation from travelers' experiences. Journal of Travel Research, 22(2), 16-20.

Prebensen, N. K., Woo, E., Chen, J. S., & Uysal, M. (2013). Motivation and involvement as antecedents of the perceived value of the destination experience. Journal of Travel Research, 52(2), 253-264.

PrimeTime: Tito Talks About Space Trip. Retrieved September 16, 2016, from http://abcnews.go.com/Primetime/story?id=132235

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(5), 1093-1102.

Ritchie, B. W., Tkaczynski, A., & Faulks, P. (2010). Understanding the motivation and travel behavior of cycle tourists using involvement profiles. Journal of Travel & Tourism Marketing, 27(4), 409-425.

Ryan, C. (2003). Risk acceptance in adventure tourism-Paradox and context. Managing tourist health and safety in the new millennium, 26(3), 473-474.

Secret space-tourism mothership unveiled. Retrieved November 7, 2016, from http://www.abovetopsecret.com/forum/thread375951/pg1

Sides, M. B., Vernikos, J., Convertino, V. A., Stepanek, J., Tripp, L. D., Draeger, J., ... & Wong, J. Y. (2005). The Bellagio Report: cardiovascular risks of spaceflight: implications for the future of space travel. Aviation, space, and environmental medicine, 76(9), 877-895.

Slanger, E., & Rudestam, K. E. (1997). Motivation and disinhibition in high risk sports: Sensation seeking and self-efficacy. Journal of research in personality, 31(3), 355-374.

Space exploration. Retrieved November 1, 2016, from https://en.wikipedia.org/wiki/Space_exploration

Space Future - An evaluation of the potential demand for space tourism. Retrieved from http://www.spacefuture.com/archive/an_evaluation_of_the_potential_demand_for_space_tourism

Space Future - Market Research. Retrieved from http://www.spacefuture.com/tourism/market.shtml

Space Radiation Could Accelerate Alzheimer's in Astronaut Brains. Retrieved November 7, 2016, from http://www.space.com/19082-space-radiation-astronauts-alzheimers.html

Space tourism: helium balloon will take passengers to the ... Retrieved from http://www.youtube.com/watch?v=uDxxKujnFqQ

Space tourism. Retrieved August 28, 2016, from https://en.wikipedia.org/wiki/Space_tourism

Space Tourism: How Much Should You Save For A Space Trip. Retrieved from https://financesonline.com/space-tourism-how-much-should-you-save-for-a-space-trip

Srivastava, M., & Srivastava, S. (2012). Space Tourism: The Future Tourism. Management Insight, 6(2).

Suppliers - About Mars One - Mars One. Retrieved November 5, 2016, from http://www.mars-one.com/about-mars-one/suppliers

Farley, F. (1991). The type-T personality. In L. Lipsitt & L. Mitnick (Eds.), Self-regulatory behavior and risk taking: Causes and consequences. Norwood, NJ: Ablex Publishers.

Talbot, J. M., & Fisher, K. D. (1985). Research opportunities in loss of red blood cell mass in space flight.

The Space Shuttle Columbia Disaster. Retrieved November 7, 2016, from http://www.spacesafetymagazine.com/space-disasters/columbia-disaster/

United States Parachute Association. (n.d.). Skydiving Safety. Retrieved May 17, 2017, from http://www.uspa.org/facts-faqs/safety

Vintage-Style Fantasy Space Tourism Posters from NASA -- Very Cool!. Retrieved November 7, 2016, from http://www.abovetopsecret.com/forum/thread1104722/pg1

Wall, M. (2011, January 27). Will Human Spaceflight Ever Truly Be Safe? Retrieved May 18, 2017, from http://www.space.com/10698-human-spaceflight-safety.html

Webber, D. (2009). Risking space in the next 50 years–perspectives for space tourism. Spaceport Associates.

Webber, D. (2013). Space tourism: Its history, future and importance. Acta Astronautica, 92(2), 138-143.

Weber, K. (2001). Outdoor adventure tourism: A review of research approaches. Annals of Tourism Research, 28(2), 360-377.

White, R. J., & Averner, M. (2001). Humans in space. Nature, 409(6823), 1115-1118.

Yiannakis, A., & Gibson, H. (1992). Roles tourists play. Annals of tourism Research, 19(2), 287-303.

Yoon, Y., & Uysal, M. (2005). An examination of the effects of motivation and satisfaction on destination loyalty: a structural model. Tourism Management, 26(1), 45-56.

Yuan, S., & McDonald, C. (1990). Motivational determinates of international pleasure time. Journal of Travel Research, 29(1), 42-44.

Zaichkowsky, J. L. (1985). Measuring the involvement construct. Journal of Consumer Research, 12(3), 341-352.

Zaichkowsky, J. L. (1994). The personal involvement inventory: Reduction, revision, and application to advertising. Journal of Advertising, 23(4), 59-70.

Zuckerman, M. (1983). Sensation seeking and sports. Personality and Individual Differences, 4(3), 285-292.

BIOGRAPHICAL SKETCH

Luyu completed her two years of study at the Department of Tourism, Recreation and Sport Management. She majored in recreation, parks and tourism. In August 2017, she received her Master of Science degree from the University of Florida.