Is Generation Z ready to fly into the space? The future of tourism is coming

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The future of tourism is coming.

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Space tourism can be considered the future of tourism, able to offer a unique experience to those brave enough to fly into space. Many private firms are competing to pioneer this new form of tourism, but the interest and expectations of potential spaceflight participants on a large scale need to be investigated in depth. This paper analyses a sample of 1,748 university students to start exploring Generation Z motivations, expectations, and willingness to pay for a space experience. A cluster analysis identified six clusters with different levels of interest in space travel experiences. The paper highlights what the possible future scenarios for space tourism may be and concludes with an identification of the underlying motivations of potential future space travelers. It discusses some early considerations of how these findings might be used to market this new type of future space experience and critical opportunities for future research.

Keywords: consumer behavior; future tourism; university students; Generation Z; spaceflight; space tourism.

Introduction

In the first stage of the evolution of a space economy, the categories of players and stakeholders in space activities were fairly limited to national and occasionally intergovernmental public bodies, mostly for space exploration and research purposes (von der Dunk, 2011). Gradually, the involvement of the private sector rose, accelerating technological innovation and significantly reducing the cost of space travel, and in an ultimate instance, opening the doors for the arrival of commercial space tourism (Friel, 2020; Weinzierl & Sarang, 2021). The hype surrounding the embryonic and growing space experience market has prompted visionary entrepreneurs, such as Jeff Bezos (and Blue Origin founded in 2000), Elon Musk (SpaceX founded in 2002), and Richard Branson (Virgin Galactic founded in 2004), to pursue the market (UBS, 2018) and reach the 5 million tourists in 2030 (Danov, 2020), to promise humanity the ultimate future destination: space (Toivonen, 2020). From this point of view, 2020 was an unprecedented year for the development of the commercial space tourism (Cohen & Spector, 2019).

In 2020, for the first time in human history, a private vehicle (built by SpaceX in cooperation with NASA) brought humans (who happened to be NASA astronauts) to space. As the latest new engineering jewels, commercial spacecraft are opening the opportunity for commercial operations to fulfil the latent demand for space tourism from high-end customers (Chang, 2015; Friel, 2020; Toivonen, 2020) interested in living a unique experience (Chang, 2017; Cohen, 2017; Laing & Frost, 2019). The cost of accessing space for individuals has fallen from the $20 million paid by Dennis Tito in 2001 to fly to the ISS to the publicised prepaid price of $250,000 for a ticket to suborbital space with Virgin Galactic, which has already presold about 600 tickets for suborbital spaceflights that have not yet taken place (Cohen & Spector, 2019) and recently has just reopened sales (Sheetz, 2021), widening the access to space tourism to a larger audience of high-end potential travelers.

Despite the intriguing destination and the uniqueness of the experience that can be lived in space, there are many open questions on the demand side. First, and above all, the interest of young adults in undertaking a space vacation in next future needs to be validated (Reddy, Nica, & Wilkes, 2012; Wang, Stepchenkova & Kirilenko, 2021). From this point of view, young adults are the generation that probably will have the chance to live this experience when it is made available to the public. In fact, the future of space tourism depends on how it will be perceived by younger generations.

These generations will have unprecedented choice of travel venues (Chambers, 2009), and thus they will be of vital importance for the growth of the commercial space tourism (Wang, Stepchenkova & Kirilenko, 2021).

In this context, the research aims to investigate the willingness of university students belonging to Gen Z, those born after 1995–1996 (Deloitte, 2019), to engage in this future form of tourism. Through a structured questionnaire administered to 1,748 university students belonging to Gen Z, the motivations and willingness to pay (WTP) of living the different forms of space flight are examined. A cluster analysis was used to analyze the data, and six clusters with different levels of interest in WTP for space travel experiences were identified. The study contributes to understanding what the possible future scenarios for space tourism may be. Some recent studies focused attention on tourism and its aspects to understand future scenarios (Matteucci, Koens, Calvi & Moretti 2022; Nematpour, Khodadadi & Rezaei 2021; Wright, 2016), and for space tourism as well, it is important to contextualizing the relevance of living a unique experience and investigate the motivations of potential future space travelers and how they could be considered to market brands and companies operating in the sector.

The paper is structured as follow: first, a definition of commercial space tourism is presented, accompanied by an illustration of the different form space travel offer, and

of the interest and motivation in living such an experience; second, a section on method and material gives detailed information on the process followed to gather and analyze data; third, findings are presented and the results of the cluster analysis are shown; finally, a discussion and conclusion are presented.

Background

Space Tourism: The Future Travel Frontier

Space tourism is widely considered a futuristic experience (Toivonen, 2020); as such, it could increasingly attract travelers seeking new vacation experiences (Chang, 2017). Many private companies – SpaceX, Virgin Galactic, Blue Origin, and Boeing, among others – are nowadays competing to secure their slice of the promising commercial space economy (Berrisford, 2018) by injecting resources into product and communication innovations to make spaceflight travel proven, sustainable, accepted and financially affordable on a scale at scale for astronauts and private citizens (Wang, Stepchenkova & Kirilenko, 2021).

Space tourism is not limited to the space flight experience, as several types of experience designs are considered space travel in the tourism literature. Crouch et al. (2009) divided embryonic space tourism into land-based space-related travel, simulations, and four spaceflight options characterized by destination and trip duration: high-altitude jet fighter flights, atmospheric zero-gravity flights, short duration suborbital flights, and longer duration (e.g., two weeks) orbital trips into space. Cater (2019) proposed an up-to-date and more complete classification of space travel activities based on the location dimension, resulting in three main categories: terrestrial space tourism (all those forms of space activities linked to specific space tourism sites i.e., simulations, tours of space facilities and edutainment), atmospheric space tourism (high-altitude jet flights -20km- and parabolic weight flights; this option enables the tourist to experience

weightless zero-gravity) and astrotourism (the most exclusive form of space tourism which is today available in the form of Earth orbit e.g., orbital and suborbital spaceflight).

Notable distinctions in the destination (e.g., suborbital versus orbital), duration, experience, cost per person and even risk related to space travel vary greatly depending on the company offering the space adventure (because of its technology and thus operating costs). For example, an orbital flight is the trip to the ISS (350km of altitude) undertaken by the American businessman Dennis Tito in 2001, replicated by several super-wealthy people in the following years, and recently successfully operated by the first private vector in history, the SpaceX Falcon 9 Dragon Crew (Cohen & Spector, 2019). The most mentioned example of suborbital flights is the case of SpaceShipTwo by Virgin Galactic, a rocket-powered plane able to travel at 100km altitude. Virgin Galactic presold 2,500 tickets at $250,000 per passenger to travel for 90 minutes aboard its SpaceShipTwo.

As a statement of readiness for commercial space travel, Sir. Richard Branson took part in the inaugural crewed suborbital Virgin Galactic flight on 11 July (2021) to get a sense of the experience that future ticketed customers will enjoy (O'Callaghan, 2021). Followed by another billionaire founder, as also Jeff Bezos (on July 2021) participated in its Blue Origin first human flight (16th flight of New Shepard, but the first with astronauts aboard) (Sheetz, 2021). And the first entirely private crewed mission into orbit (on September 2021) operated by SpaceX, the so-called Inspiration4, with a quarter of space tourists spent three days circling Earth on a mission aiming at raising $200 million for St. Jude Children's Research Hospital.

Moreover, further spaceflights with private paying passengers have been announced for the next future, and the first-ever launch of a luxury space hotel is planned for the following year by Orion Span; and trips to the Moon could become available by

the end of the decade (according to recent Musk announcements).

Reasons to undertake a Space Experience

In terms of potential participants and the demand for space tourism, this type of tourism might appeal to many for different reasons. Space enthusiasts and those dreaming about space are a natural audience for space tourism (Futron Corporation, 2002), as seeing Earth from space, experiencing the sensation of weightlessness, and experiencing a day in the life of an astronaut are mentioned in the extant literature as the main reasons to undertake space tourism (Cohen & Spector, 2019; Futron Corporation, 2002; Reddy, Nica, & Wilkes, 2012).

The uniqueness of the destination and the opportunity to experience something unusual, something that no one (or) only a few have done before, could motivate those customers interested in being pioneers (Futron Corporation, 2002) and in newness (Chang, 2017; Reddy, Nica, & Wilkes, 2012). Furthermore, the exclusivity of the destination could attract the interest of people seeking extraordinary hedonic experiences (Laing & Frost, 2019), fun, enjoyable and novel (Cohen, 2017), for which social innovation increases the positive attitude toward space tourism (Chang, 2017). In addition to hedonic motivation, Laing and Frost (2019) found eudemonic reasons, such as challenge, curiosity, spirituality and nostalgia, as well as extrinsic causes, such as seeking distinction or a desire to motivate and assist others, as further motivations for those people who actively plan to undertake a space tourism experience.

Finally, on the one hand, in some cases even negative emotions, such as risk factors inherent in space travel activities (Olya & Han, 2022), could act as a motivating factor to foster the interest (Manthiou, Hickman, & Klaus, 2020) of intrepid adventurers in space tourism (Wang, Stepchenkova, & Kirilenko, 2021). On the other hand, risk

factors and negative episodes about the space experience could also reduce interest and depress the number of people interested in the space experience (Chandler, 2007).

Extant space tourism literature is still in its infancy, and the scant existing studies are mostly conceptual papers along with some empirical studies mainly focussed on market research (Zhang & Wang, 2020). Yet the real demand and interest of the younger generations in space travel are still unproven (Wang, Stepchenkova & Kirilenko, 2021; Giachino, Pucciarelli, Bollani, Bonadonna & Koo, 2021), demand seizing is highly scenario-dependent (Crouch, Devinney, Louviere & Islam, 2009) and much remains to be understood about the motivations and expectations of the younger generations towards a space experience as a necessary condition for communicating and promoting this new form of tourism (Reddy, Nica, & Wilkes, 2012). The need to go deeper into the understanding of younger generations and their interests and motivations in undertaking a space experience is in line with the desire of private companies to invest in future generations, as they are fundamental for the growth of many industries such as space tourism (Bain & Company, 2018; Deloitte, 2019).

Previous studies have focused attention on wealthy or super-rich people who could potentially afford the multimillion-dollar ticket price to space; see, for example, the Futron Corporation's market research for NASA (2002), the sample of which was composed of 450 wealthy Americans, or Crouch and colleagues (2009) work which used a sample of 783 predominantly high-income or high-net-worth Australian individuals. With respect to the general population of a given locality, see, for example, Reddy and colleagues (2012), who used 164 Southern England citizens, or Chang (2017), who surveyed 700 (paid) Taiwanese respondents. To date, only one study has specifically looked at younger generations (see Wang, Stepchenkova & Kirilenko, 2021).

A common conclusion across studies performed in the last twenty years is that there is an overall high level of public interest and desire to travel in space, measured as a percentage of the enquired population that would like to travel in space and as the months of salary a respondent would be willing to spend for undertaking spaceflight. The potential market of 40–80% of people who desire to travel in space and are willing to pay up to one year's salary, as detected by Crouch (2001), was, for example, partially confirmed by Laing and Crouch (2004) with 58% of respondents willing to take part in a space trip (three month's salary median wiliness to pay and 12% of sample willing to pay one year or more of current salary) and by Reddy et al. (2012) who found that 54% of respondents declared an interest in undertaking a space tourism experience.

More recently, Wang et al. (2021) proposed a zoom into younger American adults' motivations and risk factors related to orbital space tourism and considered the moderating role of participation, gender, and age in enthusiasm to experience future orbital space tourism. In line with previous studies (see, for example, Futron Corporation, 2002, 2006; Laing & Crouch, 2004; Reddy, Nica, & Wilkes, 2012), Wang and colleagues concluded that a future orbital space tourist can be described as a young, male, and with a high-risk attitude who is genuinely interested in space travel and wants to experience something unique. However, more research is needed to estimate the willingness to engage in space tourism and to communicate and market space adventure with respect to less interested and motivated market segments (e.g., women and people who are afraid of risk connected to space experience).

Materials and Methods

Focus Groups and Questionnaire Design

An empirical approach has been adopted to investigate the perceptions of university students belonging to Gen Z, people born after 1995-1996 (Deloitte, 2019) – regarding space flights. According to previous studies, university students, which belong to different universities in the northwest of Italy, were chosen to collect data (Ballantyne, Carr & Hughes, 2005; Hergesell & Dickinger, 2013; Clifford, Brander, Trimble & Houser, 2018; Bollani, Bonadonna & Peira, 2019; Giachino, Truant & Bonadonna, 2020). Initially, a focus group of six members aged 19 to 24 (three males and three females) was created to explore the theme of tourism space experience among people who belong to the chosen generation. This stage allowed the authors to collect useful information to build the first version of the questionnaire, highlighting how parabolic flight, jet flight, suborbital flight, and orbital flight are considered possible options for tourism experiences.

The different types of flights identified were then considered for further analysis by including them in the first version of the questionnaire. This was tested with a second group of individuals who worked in the space sector or who had a background in the space sector, in line with Reddy et al. (2012) and Toivonen (2020). This focus group included seven individuals between 27 and 41 years of age, four men, and three women, three of whom worked in the aerospace industry, and four who had specific aerospace skills. This second group was very important in gathering more information on the accuracy of the questionnaire and allowed the authors to be more precise in the use of specific terms.

The second version of the questionnaire was structured with closed questions to facilitate the statistical analysis of data and information. This version was pretested by 20 young interviewees belonging to Gen Z. The pre-test allowed us to modify the questionnaire to make it easier to read and to carefully evaluate the order of the proposed

questions. The feedback obtained led the authors to add additional reasons that may determine the choice to participate or not in a future space experience, such as seeing the Earth from space or any health dangers.

The final version of the questionnaire was made up of three parts. The first part asked for information on the demographic and social characteristics of the interviewees, such as gender, age, and opinions/sensitivity about socioeconomic and environmental matters, including social inclusion, sharing, and redistribution of wealth, and desire for innovation. In these cases, the level of importance of the different aspects was expressed on a 7-point Likert scale.

The second part of the questionnaire investigated the perception of the different flights identified as travel opportunities and the level of interest and the specific motivations that lead to or do not lead to the desire to have such an experience. Once again, a 7-point Likert scale was used to measure motivation and interest in the experience of tourism space. Finally, the third part of the survey was devoted to assessing the WTP for the various identified flights. Again, a 7-point Likert scale was used to measure the respondents' different levels of spending intention regarding the tourism space experience.

The questionnaire was administered online, and the related link was sent to the main universities in the northwest of Italy. Specifically, the Media Centers of the two biggest universities contacted through email a total of about 10,000 university students, and a recall was made after two weeks. The questionnaire was sent in January 2020 and 2,076 questionnaires were collected (response rate 20.76%). Therefore, we checked questionnaires using two criteria: the age of the respondents and, on the remaining questionnaires, we eliminated invalid/incomplete ones. The final sample was made up of 1,748 valid responses of university students belonging to Gen Z (response rate 17.48%).

Statistical Methodology

A step-by-step path was used to summarise the answers and transform them into useful information (Bollani, Bonadonna & Peira, 2019; Giachino, Pattanaro, Bertoldi, Bollani & Bonadonna, 2021). First, some key points included in the questionnaire were considered and explored by question blocks, i.e., personal inclination, motivations related to the choice of travel, personal interest in undertaking a future space tourism experience, WTP and specific interest in a single type of space experience, each explored by summarizing a series of points collected in the questionnaire. In all cases, each of the question blocks is synthesized into a single variable that aims to reproduce the correspondent underlying concept. The synthesis of each question block is obtained through a clustering process that aims to aggregate individuals into certain homogeneous groups (see also Appendix A).

For each group, the variables were expressed on a seven-point Likert scale (only for one group of questions a different type of scale was used – see Appendix A). To avoid the noise of the data set the dimensionality was reduced performing a component analysis (more than 75% of the variance was maintained by choosing the most explanatory dimensions), finally, hierarchical cluster analysis was applied. Statistical procedures and in particular multivariate analysis were performed in the R environment (R Core Team, 2022); the analyzes were performed with the FactoMineR package (Husson, Lê & Pagès, 2017).

The summarized elements considered are the following ones.

- The personal inclination of the interviewee, which was investigated through nine variables based on Likert scales, led to three categories of subjects: *Values.Efficiency* (efficiency-oriented; Toivonen, 2020),

Values.EnvSocialOpen (open to environmental issues and social concerns; Toivonen, 2020) and *Values.Prudence* (oriented toward prudence; Futron Corporation, 2002, 2006; Laing & Crouch, 2004).

- The personal motivation of the interviewee for a trip, investigated through five variables based on Likert scales, led to three categories of subjects: *BudgetVisit* (oriented to the budget and the novelty of the destination; Laing & Crouch, 2004), *Newness* (oriented to novelties; Chang, 2017; Cohen, 2017; Reddy, Nica & Wilkes, 2012), *People* (oriented to social implications; Reddy, Nica, & Wilkes, 2012; Toivonen, 2020).

- Both favourable and contrary motivations for the interest in the space experience were analyzed, and a synthetic qualitative variable was obtained by dividing the interviewees into four groups: *Motiv_YES.Chosen* group (positive motivation, active behavior oriented to specific experiences); *Motiv_YES.Driven* group (positive motivation, passive behavior and sensitivity to external stimuli); *Motiv. NO.Fear* (negative motivation due to fear of direct experience in this area); and *Motiv_NO.Interest/Elite* group (negative motivation for unsustainability, for example, in terms of unequal access to space travel);

- The WTP to undertake a space experience, investigated through four variables based on seven progressive classes of expenditure, led to four groups of subjects: *Wtp.no_low* group (unwillingness or willingness to recognize a minimum economic value); *Wtp.(sub)orbital* group (willingness to recognize an economic value to orbital and suborbital flights); *Wtp.(sub)orbital+* group (willingness to recognize a high economic value to orbital and suborbital flights); and *Wtp.parab_jet+* group (willingness to recognize a high value as economical for jet and parabolic flights);

- The specific interest for each type of space experience, investigated through four variables based on Likert scales, led to three groups of subjects: *ExpInt.(Sub)orbital* group (high interest in orbital and suborbital flights), *ExpInt.jet_parab* group (high interest in jet and parabolic flights) and *ExpInt.nojet* group (high interest in orbital, suborbital, and parabolic flights).

In the next step, the qualitative variables (Table 1) thus obtained were synthesized in a clustering process that reached the result of a multiple correspondence analysis which transformed the qualitative variables into quantitative dimensions. The output obtained is a dendrogram with a cut level that created six clusters (Figure 1). Variables related to gender, individual values, and motivations for choosing a trip were added as 'illustrative' to better explain the results.

Variables Description

The identified sample consists of 1,748 individuals, of which 52.06% were women and 47.94% were men. The age of the respondents is between 18 and 25 years, in line with the age range of Gen Z. The variables used in the analysis are described in Table 1. Some variables (values, travel choice motivation, space motivation, WTP for specific space tourism experience, interest for specific space tourism experience) were obtained by pre-processing the data, following the above-mentioned methodology.

Table 1. Variables, items, and related descriptions

Variable	**Item**	**Description**	***Freq***	***Freq %***
Gender	Female	Female.	910	52.06
	Male	Male.	838	47.94
Values	Values.Efficiency	Respondents oriented towards technological innovation as a tool for increasing wealth production and personal income.	427	24.43
	Values.EnvSocialOpen	Respondents oriented to environmental safeguarding,	580	33.18

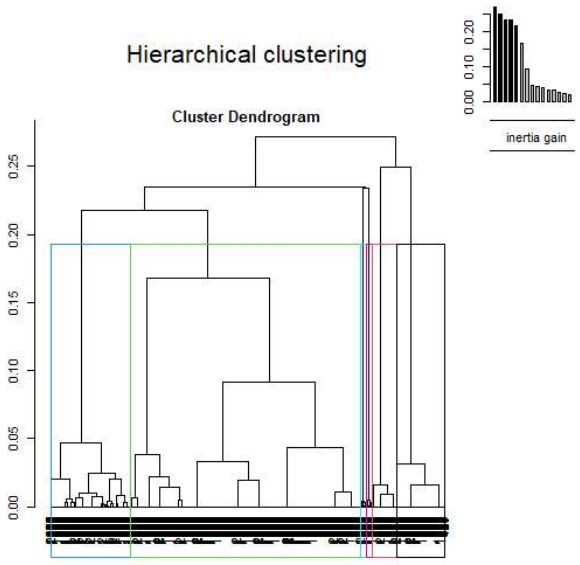
		animal welfare and social sustainability.		
	Values.Prudence	Respondents characterized by a widespread fear of what is unknown and oriented to human welfare.	741	42.39
Travel Choice Motivation	TC.Budgetvisit	Respondents oriented to consider budget and new destination as essential elements to choose a trip.	530	30.32
	TC.Newness	Respondents oriented to consider a new destination, a new experience and doing something unique as essential elements to choose a trip.	449	25.69
	TC.People	Respondents oriented to consider meeting people as an essential element to choose a trip.	769	43.99
Space Motivation	Motiv_YES.Chosen	Respondents are interested in all space experiences, e.g., willing to experience space activities such as launch acceleration, no gravity experience, seeing Earth from space.	530	30.32
	Motiv_YES.Driven	Respondents are interested in space experiences, but their interest is oriented to aspects other than space experiences, e.g., trip duration and starting location, type of aircraft used, nationality of tour provider, trip risks.	898	51.37
	Motiv.NO.Fear	Individuals to whom space flights generate fear and insecurity.	215	12.30
	Motiv_NO.InterestElite	Respondents not interested in space travel and consider it an activity exclusively dedicated to a specific group of individuals (Elite).	105	6.01
Willingness-to-pay for a specific space experience	Wtp.no_low	Respondents are willing to pay a very low sum or are not willing to pay for a spaceflight experience.	1540	88.10
	Wtp.(sub)orbital	Respondents are willing to pay a sum of money for orbital and suborbital spaceflight experiences.	153	8.75
	Wtp.(sub)orbital+	Respondents are willing to pay a high sum of money for orbital and suborbital spaceflight experiences.	28	1.60
	Wtp.parab_jet+	Respondents are willing to pay a high sum of money for jet flight and parabolic flight experiences.	27	1.54
Interest in a specific space experience	ExpInt.(sub)orbital	Individuals that consider orbital and suborbital spaceflights as very interesting experiences.	903	51.66
	ExpInt.jet_parab	Individuals that consider jet flight and parabolic flight as very interesting experiences.	614	35.13
	ExpInt.nojet	Individuals that consider parabolic flight, orbital and suborbital spaceflights as very interesting experiences.	231	13.22

Source: Authors' elaboration

Findings

The five qualitative variables identified, namely Values, Travel Choice Motivation, Space Motivation, WTP for a specific space tourism experience and interest in a specific space tourism experience, express concepts derived through the analysis of a battery of variables (Likert scale) and related frequency distributions (Table 1) and allow the description of the ways of thinking and potential behaviors of the respondents. In fact, an MCA analysis was performed on the qualitative variables identified to identify the different profiles of people belonging to Gen Z who may be interested in the experience of the tourism space. Additionally, a hierarchical clustering analysis was performed using the main MCA dimensions as input. Figure 1 shows the clusters obtained from this processing.

Figure 1. Hierarchical Clustering and Cluster Dendrogram



Source: Authors' elaboration

The analysis identified six main clusters of individuals belonging to Gen Z with different motivations that lead to appreciation or not appreciation of the space experience, different levels of interest in the four identified experiences (i.e., orbital flight, suborbital flight, jet flight, parabolic flight) and different WTP for such experiences.

The six identified clusters can be described as follows.

Cluster no. 1 (215 respondents, 12.30% - Black in Figure 3) included individuals who were not motivated to try a space experience in the future, mainly due to fear, or were moderately motivated to orbital and suborbital spaceflight and, consequently, their WTP for such experiences was near zero. They were mainly females focused on environmental safeguarding, animal welfare and social sustainability and oriented toward a new destination, a new experience, and doing something unique as essential elements in choosing a trip.

Cluster no. 2 (105 respondents, 6.01% - Red in Figure 3) included individuals who were not motivated towards a future space experience, as they considered this activity not interesting and exclusively dedicated to a specific group of people (Elite), but who were moderately motivated toward orbital and suborbital spaceflight experiences. As in Cluster no. 1, their WTP for such experiences was near zero. They were mainly females characterized by a widespread fear of what is unknown and oriented to human welfare.

Cluster no. 3 (1,017 respondents, 58.18% - Green in Figure 3) included individuals that are interested in future space experiences, but their interest is mainly oriented to aspects other than space experiences, for example, trip duration and starting location, type of aircraft used, nationality of tour provider and trip risks. They are willing to pay a very low sum or are not willing to pay for a future space experience, but they are moderately interested in all flight experiences. They are mainly male.

Cluster no. 4 (356 respondents, 20.37% - Blue in Figure 3) is composed of individuals who are willing to pay for orbital and suborbital spaceflight experiences and are interested in all space travel experiences that can be undertaken in the future. For

example, no gravity experience and seeing Earth from space. They are mainly males oriented towards technological innovation as a tool for increasing wealth production and personal income.

Cluster no. 5 (28 respondents, 1.60% - Pale blue in Figure 3) includes individuals that are willing to pay a high sum of money for orbital and suborbital spaceflight experiences and are interested in all space experiences that can be undertaken in the future, for example, launch acceleration, no gravity experience and seeing Earth from space.

Cluster no. 6 (27 respondents, 1.54% - Violet in Figure 3) includes individuals who are willing to pay a high sum of money for jet and parabolic flight experiences and consider jet and parabolic flights as very interesting experiences to live in the future.

Table 2. Summary of cluster peculiarities regarding gender, space motivation, WTP for tourism space experience, and Interest in tourism space experience.

No.	Cluster no.	Gender	Space motivation	WTP for space experience	Interest in space experience
215	1	Female	No fear	No WTP or low sum of money	Orbital and suborbital spaceflight
105	2	Female	No interest/Elite	No WTP or low sum of money	Orbital and suborbital spaceflight
1,017	3	Male	Driven/chosen	No WTP or low sum of money	Jet and parabolic flights
356	4	Male	Chosen	Medium WTP for orbital and suborbital experiences	All four space experiences
28	5	Mixed Gender	Chosen	High WTP for orbital and suborbital experiences	All four space experiences
27	6	Mixed Gender	-	High WTP for jet flight and parabolic flight	Jet and parabolic flights

Source: Authors' elaboration

Results show a polarization between the clusters in which males seem to be oriented to positively consider the space experience, and, on the other hand, females show a non-interest in these activities. The first two clusters are mainly composed of women who consider future space tourism experiences as dangerous or, in any case, dedicated to few people (elite). At the same time, they demonstrate to have a high sensibility toward

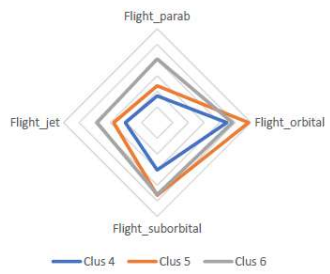
the social and/or environmental sustainability (Cluster 1 and Cluster 2) and are well disposed to try something new when traveling (Cluster 1).

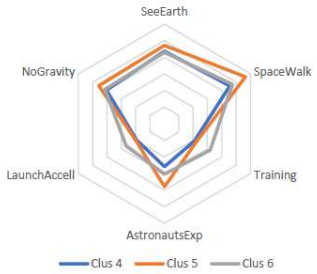
However, they also demonstrate a certain level of curiosity about orbital and suborbital flights. Furthermore, with cluster 3 (mainly composed of males), which stands for a moderate interest in the future space experience, they express a low or no WTP for an experience such as space flight. The remaining clusters, that is, 4 (mainly composed of males), 5 and 6, seem to express a greater interest in the space tourism experience. Clusters 5 and 6 are willing to pay a high sum of money for this experience and are characterized by the different experiences they would like to live, that is, orbital/suborbital flights (cluster 5) and jet/parabolic flights (cluster 6).

On the one hand, respondents from clusters 5 and 6 are not generally oriented toward an expensive mode of travel, but they are very interested in experiencing space and, therefore, are willing to pay a lot for this type of activity. On the other hand, respondents belonging to cluster 4 are willing to pay more than clusters 1, 2 and 3 because they generally pay more for traveling (see also Appendix B).

Given the motivation of the paper, which is more oriented to the evaluation of space experiences, the characteristics of clusters 4, 5 and 6 are examined with greater attention because they have demonstrated a greater WTP for space experiences. Figure 2 shows the main evidence related to WTP according to the different types of flights.

Figure 2. Different types of flights and related WTP





Cluster 4 is less marked than others and tends to offer lower average scores for all the circumstances considered, demonstrating a greater interest in orbital flight while assigning a high level of importance to price.

Cluster 5 shows a strong interest in orbital flight motivated by the desire to experience spacewalking and the astronaut's lifestyle. The price seems to be of minor importance.

Cluster 6 tends to give higher scores on average than the other clusters. Although it confirms a high interest in suborbital and orbital flight, it assigns higher scores than the other clusters for jet and parabolic flights. Strongly interested in training and launch acceleration, it is characterized by an interest in very high prices that could perhaps indicate a recognition of the quality of the experience. More details on variables and related average ratings are available in Appendix B.

Discussion and Conclusion

The era of commercial space travel officially began in 2020 with the first private spacecraft flight passenger launched into space. Space tourism can be considered as the future tourism experience for anyone brave enough to undertake a spaceflight. Whilst, in the first stage of the space race space travel access has been limited to professional astronauts and as few as seven millionaires, yet advancements in technology, launch cost reductions and the appearance of private commercial space traveling offer might enable

a greater segment of the population to consider space tourism as a viable future option. It is thus not surprising that contemporary developments and successes have sustained mass media and scholarly interest towards space, as demonstrated by the rising number of space-related academic publications, especially in tourism-oriented journals (Zhang & Wang, 2020). In general, space tourism is expected to be worth $23 billion by 2030 (according to a note to investors published by UBS Group AG analysts and reported by Sheetz [2019]), $3 billion of which would be in space tourism and $20 billion in commercial aviation.

This study identified six GenZ groups with different levels of interest in having a future space experience and different levels of WTP to live such an experience. The results reveal that two groups (CLUSTERS 1 and 2), made up of all women, are not interested in space tourism for two different motivations: the first one is due to the fact that space travelling is perceived as a dangerous activity (CLUSTER 1), while the second one is related to the feeling that is an activity reserved to high-end customers (CLUSTER 2). Notably, differences in space travel risk perception seem to exist among genders: females are showing serious concern about safety of space travelling and considering it "too risky". In line with previous research (see for example Chandler, 2007; Reddy et al., 2012; Wang et al., 2021) our study affirms that perceived high risk of such form of tourism is one of the main motivations not to consider space tourism, and it is stronger in the case of young women.

Additionally, the interaction effect of gender and age shows that the younger are the female the higher is the risk perception of the activity (on the contrary, the younger are the male the lower is the perception of risk). This evidence is in line with the study of Wang and colleagues (2020) that measure the attitudes of young Americans persons toward the space tourism.

Another cluster (CLUSTER 3) shows little interest in living a tourism space experience, but no WTP to pay for such an experience. The other three clusters (CLUSTERS 4, 5 and 6) seem to be interested in living a space experience and show a moderate-high WTP for it. Here, it is necessary to divide among those who (CLUSTER 4) are interested in space adventure but with a moderate WTP and those who (CLUSTERS 5 and 6) are very interested in such an experience with a high WTP. However, what elements would make such an experience so unique that there would be a willingness to pay a great amount of money? The interest of GenZ lies mainly in the opportunity to try spacewalking and feel the emotions of the astronauts during their missions or during the training and the launch acceleration phase. These kinds of experiences are unique and can be lived by just taking part in a spaceflight: they imagine this experience as something new and rare, and consequently, the price is not so relevant for them. The experiences for which they are willing to pay seem to be very related to the unique emotions and feelings that something exclusive, unique, and rare can give to whoever pays for it.

Our findings are relevant for several reasons. First, the study answers the call for papers to investigate the potential demand of those potentially interested in undertaking future space experiences (e.g., Reddy, Nica, & Wilkes, 2012; Wang, Stepchenkova, & Kirilenko, 2021). Second, the article contributes to filling the gap that has emerged in recent studies about the potential role of young generations in the different sectors (Bain & Company, 2018; Deloitte, 2019; Giachino, Pattanaro, Bertoldi, Bollani & Bonadonna, 2021; Wang, Stepchenkova & Kirilenko, 2021) and to the recent literature dedicated to generational perspectives (e.g., Casalegno, Giachino & Bertoldi, 2019; McKechnie, Tynan & Liu, 2015; Rese, Schlee & Baier, 2019). Third, it gives practical insights on how young generations can be engaged in future space experiences through the

communication of the unique emotions that such type of experience can give them. Younger generations, more specifically Gen Z, are totally different with respect to previous generations and have different ways of thinking, making decisions, and becoming engaged. The sooner the space sectors, including commercial space flight, understand them, the sooner they will be able to implement more effective marketing strategies.

Limitations and future research

The present study highlights the potential opportunities generated by space travel as a future step for intrepid travelers. In particular, it investigates the behavior and interest of young adults in this experience, focusing the attention on university students. On the one hand, the article contributes to generating knowledge on this topic, presenting a possible future scenario that can characterize the tourism sector. In addition, it investigates the perspective of the young adults' going more in depth in understanding their interest and motivation to consider a space adventure. On the other hand, the research is limited to a specific group of young adults, namely university students belonging to Generation Z. This is one of the limitations of the study, which should open the way to future works focused on different generations. The results are based on an initial investigation of long-term research with the aim of identifying future scenarios of the tourism sector and the relationship between young adults and space travel experience.

Future developments will be directed toward the analysis of other groups of individuals with different characteristics and age to complete the overview of the relevant elements that determine generations' choice of future experiences. In addition, the future study could also be oriented in a dedicated survey to gather a broader view of the perception of space tourism in other areas of Italy and in other countries.

Finally, there are several open questions. The research provides indications on some people willing to pay a certain amount of money for a spatial experience (however still far from the current market prices) and a future market can be hypothesized in line with Danov (2020). From this point of view, could be interesting to gain more knowledge and further explore the expectations and needs of potential future space tourists, going more in depth about the type of space experience they are looking for and/or the role played by the search for adrenaline and related risks. In this sense, it could be interesting to investigate both similarities and differences between space tourism and extreme experiences, highlighting possible differences (if any). For example, Futron (2002) reported that space tourism was perceived less risky than other tourism activities such as skydiving and mountain climbing. Furthermore, these negative motivations should be further investigated to understand what the current interpretation of main risks associated to space travel is, to be able to discuss what are the implications of those findings for future space tourism marketing. Same further investigation is needed to better appreciate the choice of the specific types of space adventures more on-demand. Yet, the high interest for spacewalk might be explained by multifarious underpinning motivations, as it allows to experience weightless, see the Earth from space, experience something unusual or novel, thus satisfies both the hedonic and innovativeness dimensions which positively impact consumers attitude toward space.

Moreover, the gender differences found could deserve further attention: a polarization seems evident between those who have no interest in having a spatial experience (mostly females) and those who have one (usually males). This difference seems to be caused by fear in new and not yet experienced activities and by the elitist character of the activity, not particularly welcome. In this sense, future research may be oriented to the analysis of specific aspects related to these two variables, even if the

prolongation of the experience and the consequent passage from an exceptional event to a conventional one should reduce psychological and / or economic barriers present today, as happened in the past for other means of transport e.g., train, car or plane. Finally, another important aspect to be mentioned is the global effort to foster female interest in STEM, since their very young age, that might positively impact future females' attitudes toward space. The recent success of female astronauts, such as for example namely Italian Astronaut Samantha Cristoforetti, in September 2022 became the first European woman to command the International Space Station. And she took the helm from the previous commander, Russian Oleg Artemyev, with her Barbie Signature Role Model in her hands and documenting everything via Twitter to reach a broader audience.

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Appendix A - Blocks of questions used in the questionnaire to explore underlying concepts.

Variables intended to explore the concept of "Values" to be defended and promoted.

The variables involved in this concept concern nine questions that investigate the level of importance attributed to the following aspects:

Environmental protection and biodiversity
Protection of animal welfare
Desire for innovation
Need for continuous change
Fear of what is unknown
Social inclusion
Wealth sharing and redistribution
Producing wealth
Increase the personal income

The summary of the answers leads to the qualitative variable "Values", obtained by breaking down the respondents into three groups with different characteristics. The frequency distribution of the variable is shown in Table 1 of the paper.

Variables intended to explore the concept of "Travel choice motivation"

The variables considered regard five questions investigating the level of importance attributed to different motivations in travel:

Available budget
Make a new experience
Visit a destination not yet visited
Meet people with similar interests
Do something unique

The summary of the answers leads to the qualitative variable “Travel choice motivation”, obtained by breaking down the respondents in three groups with different characteristics (see Table 1).

Variables intended to explore the concept of “Space motivation”

In the questionnaire there was a specific question asking for the interest in space travelling (the possible answer was yes or no); consequently, the respondents were firstly divided into two groups.

The first group made up by who answered “no” was studied considering the subsequent questions that ask the importance attributed to each of the following aspects:

It's an elitist experience that doesn't belong to me
I'm afraid to go on a space trip
I think it's not safe enough yet
I am not physically prepared
I will feel trapped in a seat for the entire duration of the flight
Easy, it is not included in my interest
Health hazard

The data about who answered “No” (not interested in space activities) were then summarised, obtaining two groups of respondents synthetically conducive to reasons of “fear” or “unsustainability” of space activities. These two groups were used as categories of the “Space motivation” variable described in table 1 of the paper. This variable is also composed of other categories: below we explain how they are obtained based on the respondents who declared an interest in space travelling.

The group declaring an interest in space travelling was studied considering three types of motivations, corresponding to three sets of questions.

General Space Experience Interest

See the Earth from space
Experience the absence of gravity
Experience acceleration in the launch phase
Experience what astronauts and cosmonauts feel

Participate in the actual pre-space flight training week(s)
Experience the "spacewalk", that is the opportunity to live an experience in orbit outside the spacecraft

Specified Space Experience Interest

Parabolic flight (flight with planes that exploiting particular parabolic trajectories allow to obtain some instants of zero gravity)
Jet flight (flight on a military jet that allows you to fly at Mach3 speed at 25,000 meters of altitude with accelerations 6 times the earth's gravity)
Suborbital flight (space flight that reaches space, but whose orbit intersects the atmosphere)
Orbital flight (space flight beyond the earth's atmosphere and back, after training)

Space choice drivers

Price
Travel risk
Duration and level of training required
Flight operated by public space agency
Flight operated by private companies (e.g. Virgin Galactic)
Nationality of the operator
Type of aircraft used for space flight (only for actual space)
Starting point location
Length of space travel
Environmental sustainability

All the motivations included in these three types of motivations, in the analysis were considered as a whole and a summary was performed distinguishing respondents in two groups, synthetically attributable to “chosen” or “driven” attitudes.

Finally, for the concept of “Space motivation” shown in Table 1, a unique variable was constituted considering a subdivision of the entire set of respondents into four parts: the respondents not interested in space tourism were divided on the basis of "fear" or "unsustainability" as adopted motivations, while those interested in space tourism were divided on the basis of "chosen" or "driven" attitudes.

Variables intended to explore the "Willingness to pay" for space experiences

The variables involved in this availability concern four questions that investigate the level of willingness to pay attributed to different sort of space flight activities:

WTP for Parabolic Space flight experience
WTP for Jet Space flight experience
WTP for Suborbital Space flight experience
WTP for Orbital Space flight experience

In this case, a scale based on expenditure classes (instead of a Likert scale) was used to assess the respondents' willingness to spend. The expenditure classes requested were as follows: nothing; less than 50 euro; less than 500 euro; 500-5000 euro; 5000-50,000 euro; 50,000-100,000; 100,000-200,000 euro; over 200,000 euro.

The summary of the answers leads to the qualitative variable "Willingness-to-pay for a specific space experience", obtained by breaking down the respondents in four groups with different characteristics (see Table 1).

Variables intended to explore "space experience interest"

The variables involved in this concept concern four questions that investigate the level of interest attributed to different sort of space flight activities:

Interest for Parabolic Space flight experience
Interest for Jet Space flight experience
Interest for Suborbital Space flight experience
Interest for Orbital Space flight experience

The summary of the answers leads to the qualitative variable "Interest in a specific space experience", obtained by breaking down the respondents in three groups with different characteristics (see Table 1).

Appendix B - Data for some insights related to the clusters.

Types of respondents (clusters) by travel budget for a two-week holiday (euro).

The following table shows a cross tabulation of the different clusters with respect to the progressive spending classes, in euro, considered by the respondents in a budget for a two-week holiday.

	≤500	500 - 1500	> 1500	Total
Cluster 1	62	127	26	215
Cluster 2	34	55	16	105
Cluster 3	293	724	-	1017
Cluster 4	23	79	254	356
Cluster 5	5	16	7	28
Cluster 6	8	12	7	27
Total	425	1013	310	1748

Average ratings of respondents for different types of flights and reasons for approaching space tourism.

The following three tables (a, b and c) show the average ratings of some questions on a 7-point Likert scale for different types of flight and reasons for approaching space tourism. These are the questions presented in the document with the spider graphs (a, b and c) in Figure 3.

(a) Interest for different types of flight (average rating on a scale from 1 to 7)

	Items	Cluster 4	Cluster 5	Cluster 6
Parabolic flight	Flight_parab	4.85	5.18	6.04
Orbital flight	Flight_orbital	6.23	6.93	6.41
Suborbital flight	Flight_suborbital	5.51	6.32	6.30
Jet flight	Flight_jet	5.02	5.39	5.93

(b) Space motivations most connected to personal choice options (average rating on a scale from 1 to 7)

	Items	Cluster 4	Cluster 5	Cluster 6
See the Earth from space	SeeEarth	6.19	6.36	6.15
Experience the "spacewalk", that is the opportunity to live an experience in orbit outside the spacecraft	SpaceWalk	6.28	6.82	6.37
Participate in the actual pre-space flight training week(s)	Training	5.04	5.11	5.59
Experience what astronauts and cosmonauts feel	AstronautsExp	5.29	5.89	5.52
Experience acceleration in the launch phase	LauchAccell	4.97	5.00	5.33
Experience the absence of gravity	NoGravity	6.02	6.29	6.07

(c) Space motivations that most induce the young consumer to approach these experiences (average rating on a scale from 1 to 7)

	Items	Cluster 4	Cluster 5	Cluster 6
Price	Price	5.41	5.21	5.96
Environmental sustainability	EnvSust	4.22	4.50	5.04
Duration and level of training required	Duration	4.94	5.21	5.19
Type of aircraft used for space flight (only for actual space)	Aircraft	4.81	4.89	4.78
Duration and level of training required	Training	4.30	4.50	5.19
Travel risk	Risk	4.73	4.71	4.96