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Meet Your Digital Twin in Space? Profiling International Expat's Readiness for Metaverse Space Travel, Tech-Savviness, COVID-19 Travel Anxiety, and Travel Fear of Missing Out

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Abstract: The metaverse promises an unimaginable future for digital travelers by enabling them to gain unique experiences (e.g., space travel) that would otherwise be impossible in non-virtual reality. Moreover, COVID-19 travel anxiety has triggered growing interest in virtual environments (e.g., metaverse travel) in the aftermath of the pandemic. The cost-conscious and tech-savvy behavior of travelers has been resurrected in the 'new normal'; however, the fear of missing out (FOMO) is now dictating travelers' choices for newness, immersive and rewarding travel experiences. To address these emerging trends, promising new technologies, and untested relationships, the present study explored the effects of COVID-19 travel anxiety on the readiness for metaverse space travel. In addition, the moderating influence of tech savviness and travel FOMO was tested on this relationship. Drawing on data of international expats (N = 386) in UAE, the finding based on structural equation modeling (SEM) revealed that the international expat's readiness for metaverse space travel is positively influenced by their COVID-19 travel anxiety. Moreover, expats with high tendencies of travel FOMO and tech savviness will experience a stronger impact of COVID-19 travel anxiety on their readiness for metaverse space travel. These novel findings guided by prominent theories (e.g., self-determination, SOR, and protection motivation) offer new insights for policy makers and practitioners to strategically achieve digital-tourism transformation and sustainability through emerging and immersive metaverse technologies.

Keywords: metaverse; space travel; digital tourism sustainability; tech savviness; travel FOMO; COVID-19 travel anxiety; virtual reality; post-COVID-19 tourism

1. Introduction

The metaverse (i.e., a digital replica of our physical world) could be a game-changer for the 1.4 billion international travelers who may also desire to travel to space, besides billionaire space explorers (e.g., Jeff Bezos and Sir Richard Branson) [1–4]. The metaverse provides digital gateways (i.e., alternative ways to travel) through an immersive virtual experience in a parallel digital universe [2]. The limitations of non-virtual recreational activities, especially during the COVID-19 pandemic (e.g., fear of new variants), have accelerated an upsurge of virtual communities, including online gaming (e.g., 350 million players and 3.2 billion gaming hours of Fortnite), and virtual reality tourism (e.g., 3D walking tours) [2,3,5]. Escaping a planet under crisis may still not be conceived in reality; however, the inevitable adoption of the metaverse is making everything possible in all virtual worlds [2,3]. The metaverse can fuel global tourism growth by promoting environment-friendly and cost-effective digital tourism, with greater freedom and flexibility [2,3]. In

the post-pandemic tourism industry, a lot of effort has been put into comprehending the psychological impacts of COVID-19 on the thought processes and purchasing behaviors of individuals [6]. The perception of health risk and motivation for self-protection has changed casual decision making into a more controlled and psychologically clouded process [7]. During the havoc-wreaking pandemic, all businesses and commercial activities around the world halted for an unannounced period. Similarly, social activities involving inter-personal interaction were strictly prohibited under COVID-19 protocols. Tourism and traveling, which is a mixture of commercial and social activities, were also devastated by the pandemic [8].

Since the emergence of COVID-19 pandemic, global tourism has dropped by over 80%, while tourist visits fell by more than 20% in the first trimester of 2020 [9]. Many hospitality-related enterprises, such as eateries, restaurants, and lodgings, have closed as a result of the COVID-19 epidemic; several nations have also closed their borders, limiting local and foreign transportation. Closed international borders were the real barriers to outbound traveling, while COVID-19 policies at national levels barred domestic tourism activities [8]. Tourists and travelers around the world were unable to continue their activities under these circumstances [10]. This unanticipated restriction of routine social and recreational activities induced an urge in the tourism community to return to normal, therefore, causing exhaustion from the pandemic and anxiety about traveling and touring again [11]. Collectively, this effect gave birth to a pandemic-born psychological condition, "COVID-19 travel anxiety (CTA)". The inability to actively take part in tourism activities and continuous fear of dealing with COVID-19-related traveling restrictions cause anxiety and unease in tourists [10,11]. Under this psychological state, people (specifically tourists and travelers) are expected to somehow manage to fulfill their cravings for the routine task of traveling, which they can accomplish by shifting the means and medium of tasks [11]. Roman et al. [3] uncovered that, when tourists were unable to practice real-time tourism due to COVID-19 protocols, the community started looking for alternative ways of continuing their activities to satisfy their urge [5,12].

One of the most accepted and appreciated modes of modern tourism is digital tourism [5]. The integration of technology into tourism gave birth to a relatively new type of tourism based on virtual reality (VR), augmented reality (AR) and self-service technology [3,5]. Digital tourism offers an experience that is nearly similar to real-time tourism in VR and AR. Virtual reality has benefited travelers all across the globe; for instance, VR tourists have seen locations as varied as the sights and destinations worldwide [5,13,14]. Even though studies show that digital-free tourism can maintain contemporaneous experiences and interactions instead of being dominated by technology [15], the use of virtual reality in museums [16] and tourism-related practices has improved travelers' perspectives [5,17,18]. An advanced form of digital tourism is metaverse space travel [2,3,19]. Newton [20] defined the metaverse as a compilation of 3D replicated virtual worlds that encourage social engagement. It is sometimes defined as a speculative incarnation of the Internet as a unified, worldwide digital environment that is assisted by the usage of augmented reality and virtual headgear [2,21]. The transforming preferences of tourists towards metaverse tourism, fueled by COVID-19 travel anxiety, is due to its safe, COVID-19-free, easy-to-use and controllable environment [11,19]. However, every single person might not benefit from this self-service technology. Tourists that are not fond of technologies and prefer natural experiences might not show interest in metaverse space traveling [2,3,22]. The interest and acceptance attitude of tourists can be measured by their tech savviness [23]. Tech savviness refers to the aptitude to interact effectively with current technology, as well as to have a deep innate understanding of how things work and the ability to handle technological gadgets, particularly computers [23,24]. A tech-savvy tourist is likely to be more inclined toward metaverse and digital tourism, while any traveler distant from technological interaction might not show as much attention to it [3,23]. Similarly, the interest and inclination of tourists toward metaverse tourism can also be influenced by the level of fear of missing out (FOMO) on traveling opportunities, as they experience

due to COVID-19 [8]. If a tourist does not feel FOMO and can wait for things to become normal, he/she would be less inclined toward digital tourism, while one who is eager to experience tourism would be ready to embrace this transformation in trend [3,8]. Therefore, tech savviness and FOMO are considered as potential moderators in the conceptual model of the present study. In the aftermath of the COVID-19 pandemic, there is a serious lack of theoretical and empirical evidence on the emerging digital tourism trends (e.g., metaverse space travel), tourists' psychological factors (e.g., COVID-19 travel anxiety and travel FOMO), and proficiency in use of technology (i.e., tech savviness). As these potential relationships remain unexplored and untested, the formulated conceptual model firstly aims to explore a direct and significantly positive effect of COVID-19 travel anxiety on readiness for metaverse space travel. Subsequently, we examine the moderating effects of travel FOMO and tech savviness on this relationship. The present study's research questions include: (1) Does COVID-19 travel anxiety affect readiness for metaverse space travel? and (2) Does travel FOMO and tech savviness positively moderate the relationship between COVID-19 travel anxiety and readiness for metaverse space travel? The theoretical background and hypothesis development of the conceptual model are discussed in detail in the next section.

2. Theoretical Background

2.1. COVID-19 Travel Anxiety

Anxiety, if defined in a general context, refers to the psychological state of emotional disorder, stress and mental distress in response to perceived risks [25]. As defined by Gudykunt and Hammer [26], anxiety is the panic regarding the adverse outcomes of any event or action that gives rise to negative psychological states such as discomfort, stress, nervousness, and emotional vulnerability. Anxiety is not a new phenomenon in the tourism industry: even during the early days of professional tourism in the mid-nineteenth century, the multifaceted emotional and behavioral reactions to traveling were widely defined as anxious conditions [27]. However, in recent times, the abruptly changing dynamics of the tourism industry under the influence of the COVID-19 pandemic have fostered an increasingly anxious and stressful environment among the traveling community [10]. The eruption of the coronavirus and continuous fear of being infected forced most professional and amateur travelers to halt their activities at once. Moreover, the closing of borders and flight operations, as well as travel destinations, ceased the already under pressure tourism industry worldwide. The inability to travel due to these unavoidable circumstances caused travel anxiety among travelers all over the world.

Several studies have looked into the linkages of COVID-19 travel anxiety with relevant issues of travel and the tourism industry, and tourist behavior [28–30]. Luo and Lam [29] empirically proved a significant negative impact of travel anxiety on travel intentions. The authors also positively linked fear of COVID-19 with travel anxiety; moreover, the relationship between fear of COVID-19 and travel intentions was also found to be indirectly moderated by travel anxiety. Kim et al. [28] also focused on linking travel anxiety with other facets of the post-COVID-19 travel industry. The authors concluded that the appraisal of travel risk severity has a positive effect on travel anxiety, which means that if potential COVID-19 infection and health risk is acknowledged by the travelers, they are more prone to experience travel anxiety. Similarly, travel anxiety, according to the authors, impacted travel desire in a negative manner. Similarly, Wachyuni and Kusumaningrum [30] also negatively linked travel anxiety with travel intentions. Concludingly, travel anxiety caused by COVID-19 has been seen as a negative influence on travel intentions [29,30], travel desire [28,31], and post-pandemic tourist behavior. Meanwhile, fear of COVID-19 (the pandemic), pandemic risk perception [32,33], and health-protective behavior [34] are potential predictors of COVID-19 travel anxiety. COVID-19 travel anxiety can be best explained through the theoretical lens of cognitive theory [35], which provides a paradigm from psychology that aims to characterize sentient behavior by gaining a better grasp of how people think. During the COVID-19 pandemic, or even after the flattening of

pandemic peaks, tourists perceive a potential health risk and see a scarcity of open tourism destinations that hold no COVID-19 restrictions. Tourists and travelers are more likely to experience stress and anxiety, according to this theory. Moreover, no bodily changes occur that trigger negative emotions, which negates the James–Lange theory of emotions proposed in 1880.

2.2. Readiness for Metaverse Space Travel

The metaverse is a collection of 3D-simulated artificial environments designed to foster social interaction [20]. It is sometimes defined as a speculative incarnation of the Internet as a unified, worldwide digital environment that is assisted by the usage of augmented reality and virtual headgear [21]. The metaverse has recently gained lots of spotlight in technology circles, as it has eased the approach to several possibilities for almost everyone. Real-world scenarios that are often hard to achieve can be easily simulated in the metaverse through virtual and augmented reality. One of the most noticeable progressions in this context is virtual space tourism. In the real world, space tourism is a commercialized activity offered to consumers by state or independent enterprises for a trip to space for a number of objectives, including space research, leisure, and business. The notion of contemporary space tourism was initially proposed in early 1970 with the Space Shuttle, which was designed to take 74 guests into orbit as well as the essential development and experimental equipment for the initial Space Station [36]. Now, with the advent of the metaverse, space tourism has become virtually accessible for anyone who has a computer and Internet access. A VR spacewalk [37], VR moon-base experience [38], and VR-based Mars mission [39] are some of the key examples of virtual-reality-based space exposures.

In parallel to the availability of VR-based tourism services, the acceptance and readiness among local tourists and travelers play a significant role in the success of this technology. Wang et al. [40] studied customer behaviors towards the consumption of technology-enabled services (TES) (i.e., a broader term for metaverse space travelling), and found out that TES perceived quality has a significant positive influence on customer's satisfaction with the TES, which, further, has a positive effect on the consumption behavior towards the TES; meanwhile, the technology readiness of customers moderated these relationships. These findings imply that the first experience of metaverse space travel can be a strong determinant of a customer's future consumption behavior. In another study by Jarrar et al. [41], it was observed that the technology readiness index (TRI) positively influenced tourist's intention to use e-tourism apps. This finding implies that the readiness for metaverse space travel heavily relies on consumers' or tourists' basic understanding of the metaverse. Shin et al. [42] also linked the technology readiness of local travelers with their intentions and satisfaction with technology-based tourism. The technology acceptance model (TAM) [43] is a specific version of information system theory, which describes how consumers embrace and utilize technologies. The endpoint, wherein consumers engage with technology, is the practical system's usage. An element that motivates consumers to adopt technology is their behavioral intentions. The attitude, which is the broader perception of the technology, influences the behavioral intentions. Metaverse space travel can leverage a new spirit for 'digital tourism' through a greater use of digital devices and tools to organize, manage, and enjoy virtual tourism experiences in space [3,19]. There has been an exponential growth in the demand for digital tourism in recent two decades, and the global online travel market is anticipated to reach USD 833.5 billion by 2025 [44]. Hence, this transformation towards digital tourism can be further accelerated through users' readiness for travel through the metaverse [2,3,19].

2.3. Travel Fear of Missing Out (FOMO)

Fear of missing out (FOMO) is one of the foremost particular and affecting emotional complications in the post-COVID-19 environment, amongst other broader cognitive repercussions. Despite the fact that the notion was first developed in an entirely unrelated situation and population [45], it aptly represents the post-COVID-19 tourism industry

when contemplating passengers' dread of missing out on possibilities to socialize, explore, and relax in leisure. FOMO is the fear and worry that someone (e.g., a traveler or anyone intending to plan a vacation) may miss out on a satisfying experience, socialization, or anything that meets individual requirements. Earlier research [45–49] used the FOMO paradigm in a variety of contexts. Przybylski et al. [45] were the first to describe and discuss FOMO in a psychological setting, as well as build the first model to assess FOMO. Another study researched FOMO in an early academic environment [48], while another research explored the phenomenon in a collegiate setting of learning [47]. The study by Abel et al. [46] focused on the association between social-media usage and FOMO intensity. Kim et al. [50] linked FOMO with consumer behavior and consumer satisfaction in a sporting event. In contrast, Milyavskaya et al. [51] provided an over-arching exploration of FOMO, its dynamics, prevalence and consequences. The FOMO concept has not been used much in the tourism and travel industry [8]. Self-determination theory [52], which outlines the three underlying emotional necessities of humans: connectedness, independence, and competency, may be used to define FOMO. People that are less pleased with their emotional requirements have greater FOMO [45], and when their needs are met, they are competent to self-determine, and, therefore, experience lower FOMO, as per theory.

2.4. Tech Savviness

Tech savviness is the ability to proficiently engage with modern technology, having an excessive intuitive knowledge of the technological operation and aptitude in handling technical devices, specifically computers [24]. Technological advancements have integrated technology into almost every field of life. This has made general consumers develop at least basic, if not advanced, technological knowledge. Moreover, today's generation (millennials) have more exposure to modern technology as compared to previous ones, which has provided us more opportunities to learn about technology. These opportunities have also shaped the interests and passion of individuals, in most cases. Furthermore, people have learned (or, at least, have started learning) to maximize the use of technology in their fields of interest. For tourists and travelers, the use of smartphone applications and software for the selection of tourism destinations, planning and executing trips is one thing [53], but experiencing traveling activities at home with the help of technology is the most advanced technological application [3]. In the context of technological advancement and metaverse travel, the existing literature focuses on tech savviness as a significant positive influence on acceptance, adaption and consumer satisfaction with modern technology. Guan et al. [54] studied influencing factors on the acceptance and satisfaction of consumers with modern technology. The authors found that tech-savvy individuals have a positive attitude toward modern technology; however, this attitude also has a significant positive effect on the acceptance and satisfaction levels of consumers. Furthermore, several researchers [17,23,55,56] have studied the role of modern technology in changing the conventional tourism trends. The existing literature also sheds light on the decisive role of the millennial generation (assumed to be tech-savvy due to increased exposure to modern technology and learning opportunities) in shaping future tourism norms under the influence of modern technology.

2.5. Theoretical Framework and Research Hypotheses

2.5.1. COVID-19 Travel Anxiety and Readiness for Metaverse Space Travel

The global outbreak of the COVID-19 pandemic has affected society in unprecedented ways (e.g., COVID-19 travel anxiety). The most significant of which is the psychological impacts of the pandemic in its aftermath. Researchers from all over the globe have tried to link these cognitive influences within their unique fields of interest [7,10,12,57–62]. Likewise, in the context of global travel, almost every destination faced some type of pandemic-related restrictions, while most countries closed borders for international traveling during the COVID-19 pandemic [63]. In such times, professional and amateur travelers were forced to stay at home due to imposed lockdowns. This continuous stay at home added to an incessant fear of being exposed to or infected with the pandemic virus, causes mental

fatigue, ultimately resulting in anxiety [10]. For tourists and travelers, this anxiety was mostly due to travel restrictions, thus causing travel anxiety. Meanwhile, the increasing popularity of the metaverse as a digital platform to interact, socialize and explore in virtual environments offered alternatives to real-time traveling. Like other activities, most travelers started shifting their physical routines toward digital or virtual solutions [3]. When filled with exhaustion, stress and anxiety, people will need something to divert their minds and refresh their psychological states; therefore, they will search for alternatives to their real-world interests and hobbies. This will foster travelers' and tourist's inclination to use metaverse platforms to mimic tourism in virtual reality. Therefore, we postulated a relationship between COVID-19 pandemic anxiety and metaverse space travel in Hypothesis 1. This hypothesized relationship can be explained with the help of the protection motivation theory [64]. The theory postulates that individual choices and decision making of people are heavily influenced by their best interest, of protection. In the current context, it implies that, when tourists and travelers feel unsafe going out and perceive a potential health risk, they will look for a safer alternative to real-time tourism (i.e., metaverse travel). The availability of space travel in virtual environments will attract most of the users due to their inability to travel through space in reality, owing to financial limitations, in most cases. Therefore, COVID-19 travel anxiety is expected to affect metaverse space travel positively and significantly according to the protection motivation theory.

Hypothesis 1 (H1). *COVID-19 travel anxiety has a significant positive effect on readiness for metaverse space travel.*

2.5.2. Moderating Effect of Travel FOMO

As previously stated, the cognitive state of FOMO, if extended to the travel industry, refers to tourists' irrational fear of missing out on chances to vacation, leisure travel, and interact. Most travelers and tourists are already experiencing COVID-19 travel anxiety from restrictions and limitations due to irregular and strict tourism activities in the post-COVID-19 environment [65], and the heightened popularity of virtual-reality-based recreational activities are influencing their aspirations to engage in metaverse traveling, prompting them to shift their interest from uneven real-world conditions to nearly ideal virtual realities [3]. In such a case, the fear of losing out on the opportunity to travel is likely to feed their urge to engage in metaverse traveling and increase their technology readiness. Based on the strength of FOMO, this psychological lure is likely to impact travelers' decision-making processes when it comes to readiness for metaverse space travel.

Even though a traveler is exhausted from closed tourism destinations or strict traveling protocols, if he or she is less concerned about losing out on traveling chances, he or she can show reluctance towards metaverse space traveling, putting a break on readiness for virtual-reality-based tourism. Likewise, if someone has a high degree of FOMO related to traveling, he or she might feel more compelled to avoid real-world traveling and instead shift to metaverse traveling for the time being. As a result, there is a perceived linkage between COVID-19 travel anxiety and readiness for metaverse space travel, which is potentially moderated by this cognitive appeal. As shown below, the predicted effect of travel-related FOMO is envisioned in Hypothesis 2. The hypothesized relationship can be examined by the SOR (stimulus-organism-response) theory. The formulated hypothesis can be better understood when viewed through the stimulus-organism-response (SOR) theory [66]. According to the theory, a stimulus incident (e.g., travel anxiety experienced by tourists due to COVID-19) induces a psychological response (e.g., the dread of losing out on traveling chances) that prompts a behavioral reaction (i.e., the readiness to join metaverse space traveling). The theory explains how travel-related FOMO affects the induction of technology readiness among domestic tourists for metaverse tourism. This theory has also been shown to be useful in analyzing users' decision-making and purchase behavior when greed and fear, caused by COVID-19, are present [61]. Moreover, a research study by Yan et al. [67] confirmed the importance of an individual's emotional and psychological

condition in shaping the influence of a stimulus on buyer rejection (reluctance) or selection (readiness) behavior.

Hypothesis 2 (H2). *Travel FOMO positively moderates the relationship between COVID-19 travel anxiety and readiness for metaverse space travel.*

2.5.3. Moderating Effect of Tech Savviness

As discussed earlier, tech savviness is proficiency in modern operating technology (e.g., computers) and having sound knowledge regarding its use [24]. The degree of tech savviness can have a potential influence on the hypothesized relationship between COVID-19 travel anxiety and readiness for metaverse space travel. A proficient tech-savvy person will have a more basic understanding and know how of the technologies involved in metaverse experiences. Therefore, he or she will experience an ease-of-use and the efficient operation of the technology. Consequently, a tech-savvy consumer or traveler will be more willing to explore metaverse traveling. While, in contrast, someone who lags behind in dealing with self-service technology may find the technological engagement difficult and, therefore, hesitate to use metaverse. Thus, tech savviness potentially moderates the relationship between COVID-19 travel anxiety and readiness for metaverse space travel. The financial obligation of real-time space traveling is substantially high, which automatically restricts a majority of tourists and space enthusiasts from experiencing it. However, the availability of VR-based space ventures in the metaverse has made virtual space traveling budget-friendly and easily accessible for almost everyone. Multiple studies have focused on exploring the intentions and willingness of general users to use metaverse services.

Guan et al. [54] studied consumers' intentions to use self-service technology and observed that attitude toward the technology is a potential predictor of consumers' intentions towards its use. Ketter [68] linked the use of modern technology with modern tourism trends. The author found that modern tech-savvy individuals are more likely to shift toward alternative, fully digital tourism. Similarly, Kim and Park [17] also explored the shifting patterns of conventional tourism towards technology-based digital tourism under the influence of the modern generation. On the other hand, Xiang et al. [56] conducted a comprehensive study on both aspects of modern information technology and consumers' behavior and role in reshaping the tourism and travel industry. Femenia-Serra et al. [23] also studied the role of modern technology in digitizing tourism services for everyone. Concludingly, modern technologies are playing a decisive role in shifting conventional tourism towards digital tourism. Therefore, being knowledgeable of these technologies would ultimately boost users' inclination towards digital tourism (i.e., metaverse space travel, Figure 1). Hypothesis 3 conceptualizes the moderating role of tech savviness in the relationship between COVID-19 travel anxiety and metaverse space travel.

Hypothesis 3 (H3). *Tech savviness positively moderates the relationship between COVID-19 travel anxiety and readiness for metaverse space travel.*
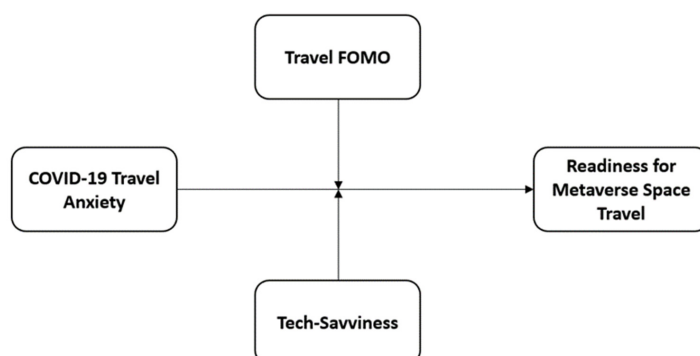
Figure 1. Conceptual model of readiness for metaverse space travel.

3. Methods

3.1. Sampling and Procedure

The purpose of this study was to examine the proposed conceptual model of COVID-19 travel anxiety (CTA) and its link with readiness for metaverse space travel (RMST), fear of missing out (FOMO), and tech savviness (TS). The international expat's population in the United Arab Emirates was targeted within a period of 8 weeks (i.e., January–February, 2022), which supplied the participant's final pool of voluntary respondents (*N* = 386). A subgroup of the original sample (*N* = 60) was used in the preliminary assessment to examine the survey's comprehensibility and covered items. There were 386 replies in the finalized sample of satisfactory, acceptable, and error-free questionnaires. Due to the strict COVID-19 requirements, information related to international expats in UAE was gathered via instant emails, which included the direct circulation of an online questionnaire, as well as across tourists' and travelers' social-media groups, and no in-person interviews. This helped prevent the common method bias that is usually prevalent. Participating international expats were found and contacted using various social media channels such as LinkedIn, Twitter, and Facebook. A mix of non-probability sampling approaches, such as judgmental sampling and snowballing method, were used to reach the preliminary sample and subsequently choose the final study sample (i.e., international expatriates). Non-probability sampling has been used in previous research and has been found to be effective in comparable situations [12]. Before the research, volunteer expats gave their informed consent, and their personally identifiable details were kept private throughout the procedure. Furthermore, response labeling was used to exclude any possibility of subjectivity in data management or evaluation.

3.2. Measures

The present study's conceptual model included four latent constructs, namely, COVID-19 travel anxiety (CTA) (independent variable), readiness for metaverse space travel (RMST) (dependent variable), travel fear of missing out (FOMO) and tech savviness (TS) (both as moderating variables). The underlying constructs of CTA, TS and travel FOMO were adapted from prominent studies, which were also re-validated through this research. The variable 'COVID-19 travel anxiety' was assessed using a 7-item construct adapted from Zenker, Braun and Gyimothy [11], which asked expats about their degree of exhaustion and anxiety about traveling and tourism activities partly halted or made difficult due to COVID-19 strict regulations and restrictions. The scale items were encrypted as CTA1–CTA7 and were designed on a 5-point Likert scale representing strong disagreement at 1 and strong agreement at 5. Likewise, readiness for metaverse space travel (RMST) was assessed with a scale developed based on prominent literature on metaverse, space tourism, and individual's readiness for new services, smart technologies and virtual experiences [1–5,19,69–72]. The RSMT scale initially had a total of 14 items coded as RMST1–RMST14, but one item (RMST11) was deleted from the finalized scale due to low loading. Examples of RMST scale items included: (1) I believe that metaverse gives greater freedom and choices to travel; (2) I believe that space travel through metaverse can be more rewarding experience; (3) I believe that space travel through metaverse is safer and more economical; (4) I am confident that I can comfortably experience space travel through metaverse; (5) I am confident to use digital clothing for an immersive experience in metaverse space travel; (6) I believe that there is no risk in using metaverse for space travel; (7) I am willing to pay for my travel to space through metaverse; (8) I believe that metaverse is a more convenient alternative for travel to space; (9) I believe that metaverse can give more control in experiencing travel to space; and (10) I would like to try all special features that makes metaverse space travel more rewarding and memorable.

An 8-item scale was adapted from Zaman et al. [8] to measure international expat's travel FOMO. A 5-point Likert scale was used to set the items, which were coded as FOMO1–FOMO8. Finally, the tech savviness scale was adapted from seminal research on the tech savviness of museum visitors [22] and millennial tourists [23]. The adapted

scale initially included 15 items (TS1 to TS15); however, 3 items (TS2, TS5, and TS8) were deleted due to low loading values and to ensure the internal validity of the scale. Before finalizing the survey for data collection, all measures (i.e., either developed and/or adapted scales) were firstly evaluated by senior academics (N = 6) as well industry practitioners (N = 5). Subsequently, based on constructive feedback, all scales were carefully refined to adequately establish their psychometric properties [8].

3.3. Data Analysis

Initially, data normality, descriptive analysis and variance inflation tests were conducted to check the suitability and reliability of the collected data. The covariance-based structural equation modeling (CB-SEM) technique was utilized to investigate the established conceptual framework quantitatively. SEM technique and its most common implementations have lately garnered a lot of interest in the scientific community. Several research works, on the other hand, have recommended using SEM based on the nature of variables and data collected, stressing the advantages of SEM over other approaches when greater internal reliability and stronger path coefficients are needed [73,74]. SEM has been frequently used in psychological and behavioral research [10,12], while CB-SEM is a better SEM approach that shows potential for use in future research. This method was implemented to the gathered data using the AMOS software application. AMOS offers a number of time-efficient and user-friendly statistical modeling and analysis options. The software includes a multitude of methodologies, simulators, and built-in applications in a simple style. The usage of graphical representation formats to show analysis and findings helps to improve task representation. Demographics profiles of the study sample of international expats is represented as Table 1.

Table 1. Demographics profiles of international expats (N = 386).

Items		Frequency	Percentage
Gender	Male	259	67.1%
	Female	115	29.8%
	Prefer not to say	12	3.1%
Age	18–24 years	28	7.3%
	25–34 years	65	16.8%
	35–44 years	109	28.2%
	45–54 years	98	25.4%
	55 years and above	86	22.3%
Education status	High School or below	35	9.1%
	Bachelor's degree (or equivalent)	111	28.8%
	Master's degree (or equivalent)	182	47.1%
	Doctoral degree (or equivalent)	58	15%
Annual income (equivalent in USD)	USD 25,000 or less	20	5.2%
	USD 25,001–USD 50,000	50	13%
	USD 50,001–USD 75,000	75	19.4%
	USD 75,001–USD 100,000	86	22.3%
	USD 100,001–USD 150,000	104	26.9%
	USD 150,001–USD 200,000	28	7.3%
	USD 200,001–USD 250,000	11	2.8%
	USD 250,001 or more	12	3.1%

4. Results

4.1. Data Normality and Descriptive Analysis

The descriptive and normality assessments test included (1) normality tests (i.e., visual and statistics inspection), (2) descriptive statistics, and (3) a variance inflation test (VIF). To initiate the normality assessments, the study identified the 29 outliers' cases that were affecting the normality of the data. Using the rule of thumb [75] for bivariate and multivariate outliers, these cases were deleted to attain normality, and 386 out of the 415 observed data items proceeded to the next phase of analysis. After this initial screening, a visual inspection also found that there was no presence of normality threatening outliers. Later, the multicollinearity issue was evaluated using the VIF; the results demonstrated that the reported VIF for items was below the threshold (10) statistics in the initial part of the analysis. Followed by multicollinearity assessment, the descriptive analysis was carried out. The results suggested that the mean and standard deviation values for each variable were within the recommended ranges (i.e., $N = 1$ to 5, and SD= -1 to $+1$). The skewness and kurtosis values were also found to be within their cut-offs ($+2.58$ to -2.58) when divided by their standard errors [75]. Hence, the data normality assumption that is required for the use of covariance-based structural equation modeling (henceforth SEM) was met.

4.2. Common Method Variance (CMV)

After the descriptive analysis, the study proceeded with the CMV assessments using the marker variable method, commonly known as a common latent factor (CLF) on AMOS 24. This method can rigorously observe any potential bias created by CMV, also called common method bias (CMB). The bias is created due to inflation of the predictable association among the constructs. This technique was adapted instead of using the outdated method of the Herman single factor test. The CMV approach using marker variable is a widely acceptable, valid, and rigorous approach to finding any potential issue regarding CMV by comparing the values of the standardized regression before and after running the CLF test. To perform this, all factors were loaded on a single factor. The results revealed that the difference between the standardized regression values of the observable constructs was found to be below 0.20 when loaded on a common factor. Thus, the data revealed no issue regarding CMV.

4.3. Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA)

After evaluating the CMV, the research later continued on to perform EFA using the principal axis method by adding all the constructs of the study. The results of the EFA reported in Table 2 revealed that items of RMST, CTS, TS and travel FOMO yielded satisfactory factor loadings (>0.40). Based upon these results, all items of RMST, CTS, TS and FOMO were retained for further analysis. To attain the measurement model fitness, the items of the involved variables that yielded a standardized factor loading lower than 0.50 were deleted. The CFA is graphically presented in Figure 2. The results of the CFA indicated the good fit measurement model based on multiple fit indices ($x^2 = 2145.83$, df = 793, $p = 0.001$, $x^2/\text{df} = 2.7$, CFI = 0.95, AG-FI = 0.93, TLI = 0.97, SRMR = 0.051, RMSEA = 0.034). However, to attain a good fit model, four items were deleted: three items from the construct of TS and one item was RMST. The items of each variable, CTA, RMST, FOMO and TS, are presented in Table 3, and the deleted items are also reported. To evaluate the internal reliability and convergent validity of the variables of interest, Cronbach's alpha, average variance extracted (AVE), and composite reliability (CR) were also computed. The results of the CFA revealed that the AVE, CR, and Cronbach's alpha were found to be far above the recommended cut-off estimations [76,77]; hence, the convergent validity and reliability were well established (see Table 2).

Table 2. Measurement model (*N* = 386).

Variables	Indicators	EFA Loadings	CFA Loadings
COVID-19 travel anxiety (*AVE = 0.664;* *Cronbach's Alpha = 0.874; Composite Reliability = 0.931*)	CTA1	0.91	0.96
	CTA2	0.85	0.91
	CTA3	0.81	0.78
	CTA4	0.73	0.67
	CTA5	0.76	0.70
	CTA6	0.78	0.71
	CTA7	0.87	0.92
Travel fear of missing out (*AVE = 0.567;* *Cronbach's Alpha = 0.910; Composite Reliability = 0.915*)	FOMO1	0.80	0.77
	FOMO2	0.68	0.61
	FOMO3	0.62	0.58
	FOMO4	0.71	0.63
	FOMO5	0.90	0.93
	FOMO6	0.89	0.91
	FOMO7	0.83	0.85
	FOMO8	0.72	0.66
Tech savviness (*AVE = 0.612;* *Cronbach's Alpha = 0.821; Composite Reliability = 0.949*)	TS1	0.71	0.69
	TS2	0.49	0.27 *
	TS3	0.76	0.64
	TS4	0.77	0.73
	TS5	0.45	0.21 *
	TS6	0.85	0.76
	TS7	0.72	0.74
	TS8	0.64	0.32 *
	TS9	0.66	0.71
	TS10	0.87	0.83
	TS11	0.88	0.86
	TS12	0.87	0.79
	TS13	0.72	0.81
	TS14	0.73	0.66
	TS15	0.83	0.77
Readiness for metaverse space travel (*AVE = 0.612;* *Cronbach's Alpha = 0.840; Composite Reliability = 0.953*)	RMST1	0.87	0.83
	RMST2	0.89	0.78
	RMST3	0.62	0.66
	RMST4	0.89	0.85
	RMST5	0.91	0.93
	RMST6	0.88	0.85
	RMST7	0.84	0.88
	RMST8	0.78	0.80
	RMST9	0.81	0.77
	RMST10	0.74	0.56
	RMST11	0.54	0.29 *
	RMST12	0.76	0.67
	RMST13	0.82	0.76
	RMST14	0.75	0.70

Note: Standardized loadings; * = items deleted due to low loadings.

Table 3. Descriptive statistics (*N* = 386).

Variables	Mean	SD	Skewness		Kurtosis	
			Value	Std. Error	Value	Std. Error
RMST	4.4788	1.03878	0.671	0.310	0.426	0.248
CTS	5.2566	1.18575	0.377	0.310	0.312	0.248
TS	4.8223	1.14441	0.506	0.310	0.216	0.248
FOMO	5.0130	1.09480	0.157	0.310	0.376	0.248

Note: CTA: COVID-19 travel anxiety, RMST: readiness for metaverse space travel, FOMO: fear of missing out and TS: tech savviness.
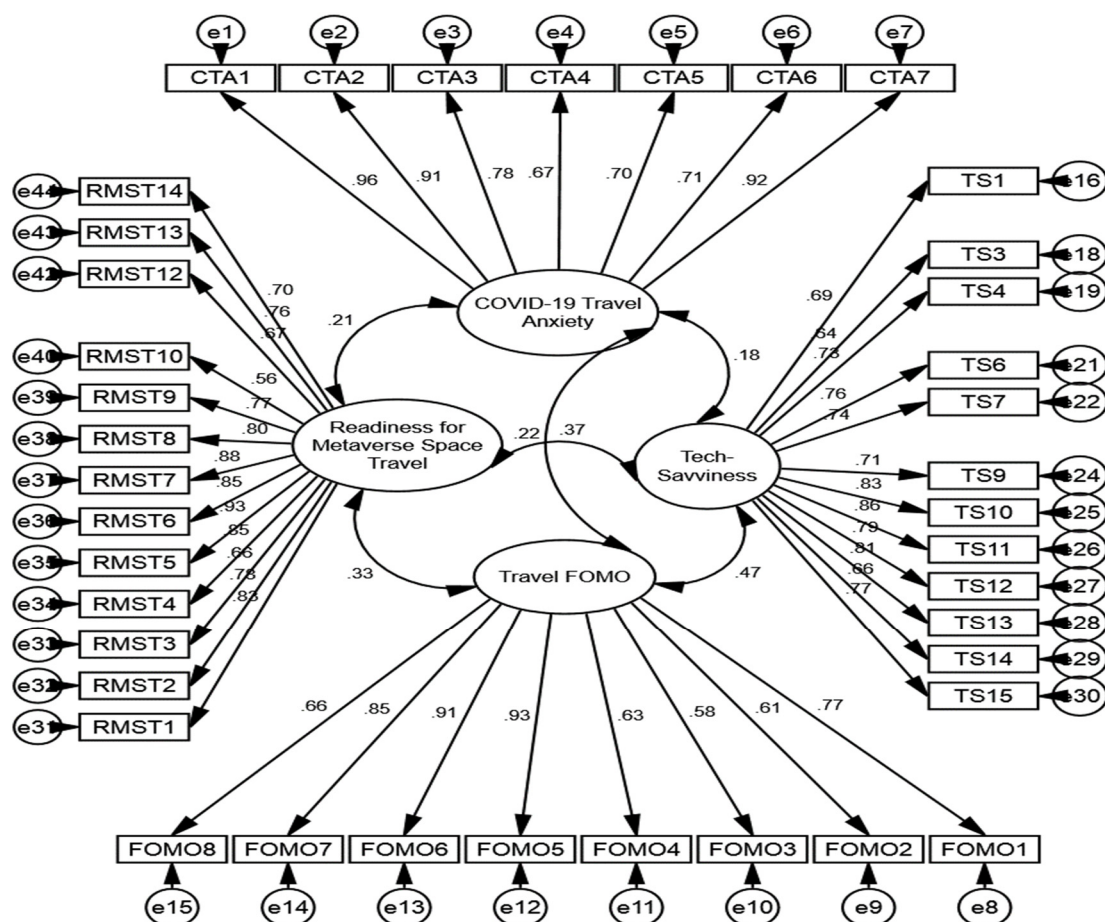
Figure 2. Measurement model.

Furthermore, the observed data was also evaluated for discriminant validity using the Fornell and Larcker method [78]. To perform this, the multicollinearity was assessed using the comparison between the squared association estimations of the variables with the squared root of the AVE estimations. The results reported in Table 2 suggested that the square root of the AVE was greater than the correlations between variables. Thus, the discriminant validity was established, and no issue of multicollinearity was found, which is critical for assuring the accuracy of the SEM results.

4.4. Hypothesis Testing

This research postulated three hypotheses about the association among the antecedents of the readiness for metaverse space travel. The first hypothesis outlines direct influence and the next two hypotheses outline the moderating influences of theoretically proposed latent variables on readiness for metaverse space travel. In order to substantiate these theoretically proposed outlines, two separate structural models were employed using co-variance SEM on AMOS 24.0. Firstly, a structural model was employed to unfold the postulated direct influence of: (1) COVID-19 travel anxiety (H1) on readiness for metaverse space travel. The model demonstrated good fit based on multiple fit indices (x^2 = 1356.28, df = 519, *p* = 0.01, x^2/df = 2.61 CFI = 0.99, AGFI = 0.97, TLI = 0.99, SRMR = 0.043, RMSEA = 0.031). The inferential analysis results of SEM (see Figure 3) exhibited that COVID-19 travel anxiety has a positive (β = 0.26) and significant (*p* = 0.001) influence on readiness for metaverse space travel and the model revealed an overall variance of 37%. The results, thus, verified the theoretical postulated relationship (H1) between COVID-19 travel anxiety and readiness for metaverse space travel and H1 was accepted (see Table 4 and Figure 3).
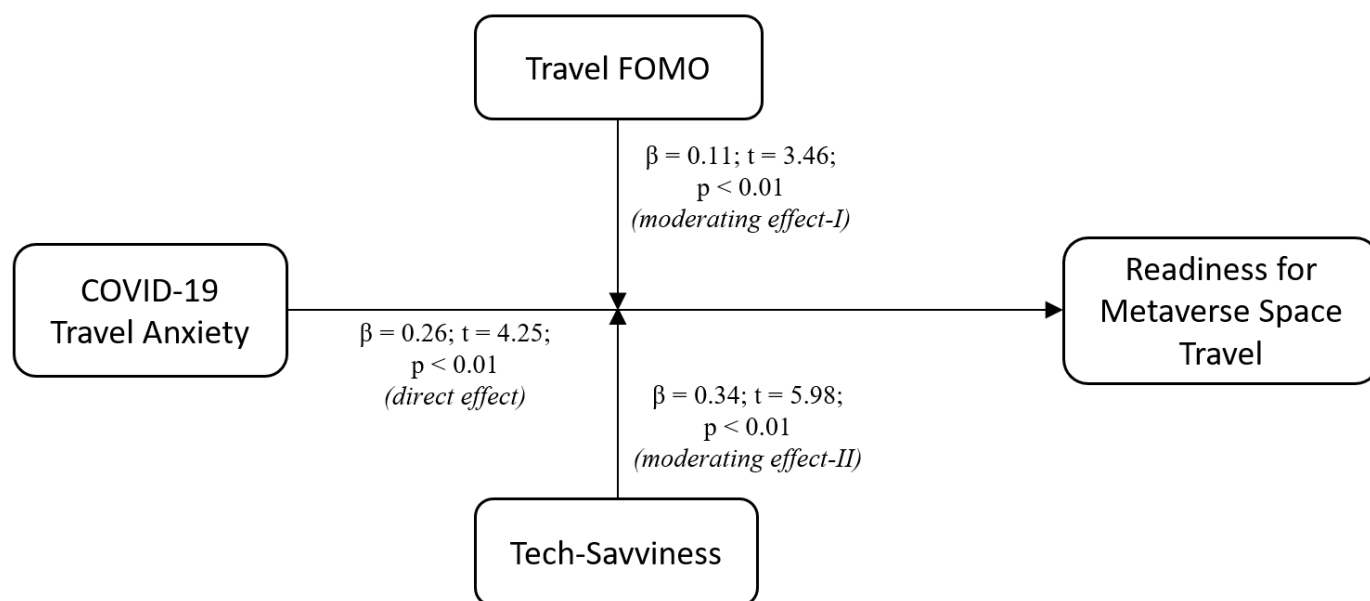
Figure 3. Structural model.

Table 4. Multicollinearity and discriminant validity (*N* = 386).

	FOMO	RMST	TS	CTA
FOMO	0.753			
RMST	0.335	0.782		
TS	0.469	0.373	0.782	
CTA	0.222	0.214	0.178	0.815

4.5. Moderation Analysis

Drawing upon the suggestions in the literature [79], this research used a step-wise moderation testing method by running the first model without adding the interaction terms in model 1 (Table 5). Onwards, the second model was used after adding the interaction terms (CTA_X_FOMO) and (CTA_X_TS) to tap the moderating effects of FOMO and TS. This research was able to find out whether the strength and direction of the association among COVID-19 travel anxiety and readiness for metaverse space travel is a function of the FOMO and TS, after introducing the moderating effect terms in model 2. In addition, the bootstrapping procedure using the maximum likelihood method was also employed to compare the overall change in the variance in both models. The model, after the addition of the interaction terms (CTA_X_FOMO and CTA_X_TS) verified the positive moderation influence of FOMO (β = 0.111 and *p* = 0.001) and TS (β = 0.34 and *p* = 0.001) in outlining the relationship between COVID-19 travel anxiety and readiness for metaverse space travel. In addition, the model exhibited a total variance of 53%; thus, H2 and H3 were supported. Hence, it was empirically evident that a higher degree of FOMO and TS leads to a higher inclination towards readiness for metaverse space travel.

Table 5. Structural equation model—hypothesis testing results (*N* = 386).

Paths	β	*t*-Values	*p*-Values	R^2	Outcome
CTA -> RMST	0.26	4.25	<0.01	0.37	H1 Supported
FOMO -> RMST	0.19	3.67	<0.01		
TS -> RMST	0.45	5.18	<0.01		
CTA_X_FOMO -> RMST (Moderation)	0.11	3.46	<0.01	0.53	H2 Supported
CTA_X_TS -> RMST (Moderation)	0.34	5.98	<0.01		H3 Supported

Note: CTA: COVID-19 travel anxiety, RMST: readiness for metaverse space travel, FOMO: fear of missing out, TS: Tech savviness, and X = interaction term.

5. Discussion

The conceptual model of this study explored the effects of COVID-19 travel anxiety on readiness for metaverse space travel under the moderating influence of travel FOMO and tech savviness. The COVID-19 outbreak has significantly altered the decision-making process of the general masses at conscious and sub-conscious levels, compelling them to take a controlled and health-risk-oriented approach instead of casual and fear-free decisions [12,30]. In the context of global tourism, travelers and tourists were stuck at home under COVID-19 protocols that subsequently ignited the desire to revenge travel as soon as vacation destinations start to open again [10]. COVID-19 travel anxiety is evident among the global expats community, representing unprecedented effects on their acceptance (or rejection) of travel alternatives during the pandemic [11,12]. In the following paragraph, findings from the empirical analysis are discussed in relation to previous research.

Firstly, reliable empirical evidence established support for the first hypothesis, which postulated that COVID-19 travel anxiety has a significant positive effect on readiness for metaverse space travel. COVID-19 travel anxiety has been studied in earlier research more recently [11]. It has also been negatively and significantly linked with traveling intentions by Luo and Lam [29]. Moreover, fear of COVID-19 was seen as a predictor of travel anxiety in the same study. Similarly, Wachyuni and Kusumaningrum [30] also proved a negative effect of travel anxiety on travel intentions. Kim et al. [28] also observed that tourists experiencing travel anxiety are less inclined toward real-world traveling. Instead, real-time tourism and traveling activities have gradually shifted toward digital and virtual solutions, as mentioned by Roman et al. [3]. Moreover, VR and space tourism has also been seen as the next normal in the pandemic-affected tourism industry. Secondly, it was observed that travelers' fear of missing out (FOMO) moderated the relationship between COVID-19 travel anxiety and readiness for metaverse space travel in a significantly positive way. Yan et al. [67] already confirmed the influence of an individual's psychological and emotional state in deriving purchase behaviors under the stimulus-organism-response (SOR) theory by Woodworth [66]. Similarly, by employing the SOR theory, Satish et al. [61] also confirmed the influence of fear and greed (which, collectively, form the FOMO concept) caused by COVID-19 on the thought and decision-making processes of customers. However, the specific integration of FOMO in the traveling and tourism industry and its linkage with tourists' behaviors is still novel [8].

Last but not the least, Hypothesis 3 of the conceptual model was also supported by the outcomes of CB-SEM analysis. This advocates for the significantly positive moderating effect of tech savviness on the relationship between COVID-19 travel anxiety and readiness for metaverse space travel. Tech savviness has already been defined by Apergis [24], while it was observed by Guan et al. [54] that sufficient knowledge of self-service technology (i.e., a broader term for the tech to be used in metaverse space travel) fosters consumers' intensions to accept and use it. In contrast, a consumer having relatively less knowledge and interest associated with modern self-service technologies will be more likely to reject and avoid metaverse space travel. Similarly, Kim and Park [17] agreed with the active role of new generations (e.g., millennials and Gen-Z) in shifting conventional real-time

tourism to technology-based digital tourism (i.e., metaverse or VR-based tourism). In addition, Femenia-Serra et al. [23] comprehended the role of modern technologies such as virtual reality (VR) and augmented reality (AR) in reshaping conventional tourism as digital tourism. Although some of the variables used in this study (i.e., travel FOMO and metaverse space travel) are relatively new to the tourism research, the literary support from previous studies complements our novel findings through a cross-disciplinary and broader perspective of digital tourism.

5.1. Theoretical Implications

The present study developed and tested an inter-disciplinary conceptual model that bridges emerging concepts in global tourism under COVID-19 (i.e., COVID-19 travel anxiety), digital tourism advancement (i.e., metaverse space travel), use of technologies (i.e., tech savviness) and tourists' psychological motives (i.e., travel FOMO). By doing so, this research work opens paths for integrating these concepts borrowed from multiple disciplines, such as psychology, technology, and healthcare, into tourism industry research. Hence, this inter-disciplinary study is beneficial for multiple fields of research in terms of managerial as well as theoretical implications. Taking theoretical support from underpinning theories, including cognitive theory [35], the James–Lange theory of emotion, technology acceptance model [43], self-determination theory [52], protection motivation theory [64], and stimulus-organism-response theory [66], the present research found empirical evidence in favor of the conceptual model that offers practical implications of these theories in global tourism. COVID-19 travel anxiety has been recently explored in the specific context of COVID-19 tourism [29,30,32]. Hence, linking COVID-19 travel anxiety with emerging modes of digital tourism (i.e., readiness for metaverse space tourism) offers significant theoretical insights and contribution. Moreover, the significantly positive moderating influence of travel FOMO also establishes theoretical contributions by generating new knowledge on travel FOMO, especially when and how it can alter the relationship between COVID-19 travel anxiety and readiness for metaverse space tourism. Lastly, tech savviness also showed supporting evidence for acting as a significant and positive moderator that strengthens the influence of COVID-19 travel anxiety on readiness for metaverse space travel. Hence, this new knowledge on the use of self-service technologies (i.e., tech savviness) in activating users' readiness for metaverse space travel promises theoretical guidance for future studies on digital tourism.

5.2. Managerial Implications

Apart from theoretical implications, the findings of this study can be helpful in several contexts from a practical and managerial point of view. Effective management in the tourism industry requires a combination of the practical application of concepts from social and psychological science to comprehend the behaviors and responses of tourists [80]; therefore, the implication of this conceptual model can help in achieving higher standards of management in the tourism industry. Firstly, a significant positive effect of COVID-19 travel anxiety on readiness for metaverse space travel can be used by both tourism industry management and technology management. Businesses related to the tourism industry can make the most out of this trend of digital tourism by preparing to change their business models and tactics. Conventional tourism businesses need to partner with technology companies and provide self-service technology to satisfy tourists' and travelers' increasing inclination towards metaverse or VR tourism. On the other hand, technology companies already working in the metaverse and VR domains can integrate digital and virtual tourism activities to attract a huge consumer base, including tourists and travelers. Both the beneficiaries, tourism businesses and technology businesses, can alter or modify their business models and plans based on the moderating variables (FOMO and tech savviness). For example, tourists from a country or a region where the COVID-19 pandemic had a significant impact are expected to undergo more travel anxiety than those where COVID-19 did not wreak havoc. Consequently, the formerly mentioned tourists would

have high FOMO and, ultimately, they will be more open to metaverse space travel as compared to the latter. Therefore, companies can increase or decrease the scope of their business according to the intensity of the pandemic in the region.

5.3. Limitations and Future Research

The quantitative data investigated in this research work was collected from international expatriates in United Arab Emirates. The selected research sample comes from a very small group of international tourists and travelers' communities; therefore, it is a limitation of this study that the outcomes cannot be reliably generalized to the wider research population. To circumvent this shortcoming, a research sample consisting of tourists from different backgrounds and unique demographics should be selected so that a better representation of this community can be achieved. Secondly, the questionnaire and scales use quantitative type research instruments only, while it has been established in the same context that qualitative instruments give the respondents freedom of expression [81], which is useful to extract maximum information from the participants. Future studies can develop or adapt a research instrument that is a blend of quantitative and qualitative approaches, including open-ended as well as close-ended questions, to obtain maximum and useful information from the research pool. Lastly, the sampling techniques used in this study are the judgmental and snowballing methods, which can produce a research pool from a narrow segment within the research population; therefore, it is suggested that different sampling methods should be employed to reach out to and represent a maximum portion of the research population.

6. Conclusions

The post-COVID-19 research has largely remained focused on recovery, sustainability and regeneration in global tourism [8]. However, technological advancements have led to the emergence of new modes of digital or virtual tourism (e.g., metaverse tourism) under the influence of the psychological impacts of COVID-19 (e.g., COVID-19 travel anxiety and travel FOMO) [3,8,11]. Digital tourism (e.g., touristic YouTube videos, live destination cameras and interactive maps) have allowed travelers to explore destinations without leaving the comfort of their homes. Hence, the digital future of global travel is being accelerated through the transition of real-world tourism to metaverse tourism as a reality of the 'new normal' [2,19]. To address these emerging touristic and digital trends, the present study explored the linkages between COVID-19 travel anxiety (CTA) and readiness for metaverse space travel (RMST), under the moderating influence of traveler's fear of missing out (FOMO) and tech savviness (TS). Based on perceptions of international expats (N = 386), the novel findings of this research highlight evidence that readiness for metaverse space travel can be significantly influenced by the degree of COVID-19 travel anxiety, also, when travel FOMO and tech savviness positively moderate this relationship. The present study bridges the calls for inter-disciplinary research in tourism (e.g., social psychology, space tourism and metaverse technologies) by developing and validating a holistic model of RMST based on prominent theories (e.g., self-determination, protection motivation and SOR theory). Finally, the present study offers new and interesting evidence for global tourism policymakers and practitioners, to better conceive the strategic role of the metaverse in providing alternative digital or virtual tourism platforms to tech-savvy travelers and tourists, especially those who are experiencing COVID-19 travel anxiety and fear of missing out on travel opportunities [2,8,11,22,69].

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