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Factors Predicting Public's Willingness to Support National Aeronautics and Space Administration's Artemis Mission

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Factors Predicting Public's Willingness to Support National Aeronautics and Space Administration's Artemis Mission

By

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This dissertation was prepared under the direction of the candidate's Dissertation Committee Chair, Dr. Scott R. Winter, and has been approved by the members of the dissertation committee. It was submitted to the College of Aviation and was accepted in partial fulfillment of the requirements for the Degree of Doctor of Philosophy in Aviation.

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Abstract

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NASA's Artemis program aspires to return astronauts to the moon and aims to land the first woman and person of color on the lunar surface. The endeavor symbolizes the next evolution in space exploration and serves as a testament to the human spirit of discovery. In the face of this significant undertaking, gauging public sentiment and understanding the factors driving public support becomes necessary. The current study aimed to address a critical gap in the literature by examining public support for NASA's Artemis mission, which is essential for sustaining the program's momentum and cultivating a culture of innovation and exploration.

The novelty of this research lies in its approach to understanding factors that influence public support. Prior studies have generally focused on public sentiments and general attitudes towards space exploration, without identifying the nuanced perceptions underlying that support. The cross-sectional study employed a quantitative, non-experimental research design to investigate public perceptions and support for NASA's Artemis mission. A two-stage approach was used, surveying 1,110 U.S. citizens using Amazon's Mechanical Turk. Structural Equation Modeling was used to analyze the survey results and to test the hypothesized model, a technique that allows for examination of complex relationships between variables.

The study revealed that, in order of effect size, Familiarity with Artemis, Complexity Perception, Wariness of New Technology, and Future Time Perspective influenced an individual's willingness to support NASA's Artemis Mission, explaining 87.5% of the variance. The model was successfully replicated in the second stage, providing a robust and validated model for future research. The research will enhance the understanding of public support for the Artemis mission and offer potential insights for diverse stakeholders, encompassing NASA, the federal government, and commercial space entities. The research contributes to the body of knowledge by offering a detailed understanding of factors that influence public support of Artemis, thereby informing strategies to improve public engagement and support. The findings underscore a need for improved and targeted communication strategies that address complexity, new technologies, and improve familiarity of the Artemis program.

Keywords: NASA, Artemis, structural equation modeling, human factors, public support, human spaceflight

Dedication

I would like to dedicate this accomplishment to my late parents, John and Mary, whose values and dreams live on in me: though you are not here to witness this milestone, your guidance and love have been my guiding stars.

And to my wife, Nadia, the unsung hero of this journey. Your unwavering faith, boundless patience, and relentless support have been the quiet yet powerful force behind every word written and every challenge overcome. Your sacrifices, often unseen yet always deeply felt, have been instrumental in bringing this dream to fruition. This dissertation stands as much a testament to your strength and love as to my own perseverance. Your belief in me never wavered. Your presence has been a constant reminder that the greatest achievements are not accomplished alone but shared with those who walk alongside us.

This accomplishment, while mine in name, is ours in spirit. It is a reflection of your unyielding support and our shared journey. Thank you for being the light on my path and the strength behind my ambitions. This is for you as much as it is for me.

Acknowledgments

The journey to complete my dissertation would not have been possible without the support of countless individuals. For those whom I may not name explicitly, please know that your contributions are deeply valued and appreciated.

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To my committee members, Dr. Stephen Rice, Dr. Joseph Keebler, and Dr. Gajapriya Tamilselvan – your contributions have been crucial to my success. Dr. Rice, your willingness to mentor and teach has been a guiding light. Dr. Keebler, your expertise has significantly enhanced my research. Dr. Tamilselvan, your dedication, especially as an external member, has been immensely appreciated. The staff and faculty of the School of Graduate Studies and the College of Aviation deserve special recognition. Your collective efforts have been the foundation of my success.

To Cohort 13, our small but mighty group has made a significant impact. Liz and Katherine, your support in my research endeavors has been invaluable. Lissa, Kim, and

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Chapter I: Introduction

Chapter I introduces the research that was conducted for the current study. A brief background is presented that informs the statement of the problem. After the statement of the problem is addressed, the purpose and significance of the research is discussed. Additionally, research questions and hypotheses central to the study are introduced along with the delimitations, limitations, and assumptions. Finally, the chapter concludes with the definition of key terms and a list of acronyms.

Background and Overview

December 14th, 2022 marked the 50th anniversary of a human's last step on the Moon during the Apollo Program. Since then, the National Aeronautics and Space Administration (NASA) has been a world leader in space exploration; however, returning to the lunar surface was far from their goals for Human Space Flight (HSF). It was not until December 11th, 2017, when President Donald Trump signed Space Policy Directive 1, that NASA’s priorities changed. The President directed NASA to return astronauts to the Moon with the assistance of the private sector, followed by missions to Mars and beyond (Wang, 2017).

SpaceX launched the first all-civilian orbital space flight on September 16, 2021, Inspiration4. The media coverage and public support for this mission were positive, as they raised $243 million for St. Jude Children’s Research Hospital (2022). In a recent interview with Jared Isaacman, he was asked what he thought was the most crucial thing that Inspiration4 accomplished from his perspective. His answer was the messaging:

> This is such an exciting time for HSF, I mean this is like the second age of space exploration 2.0, but it doesn’t have to last indefinitely, if, you know, opinions

> shift, and people don't realize that it is important to make progress in space. But you can also make progress here for some of the hardships we are all faced with every single day. And if you lose sight of that messaging and people just see it as a big expenditure and a big waste, then we can see... all this momentum we've been gaining over the last couple of years completely reverse course. This [HSF] is not set in stone at all. (Embry-Riddle Aeronautical University, 2022, 5:50)

The messaging is a pivotal concern not only for HSF in general but also for NASA. Inspiration4 generated new enthusiasm from the public, but this enthusiasm should not distract from the underlying public perceptions of HSF, specific to NASA's Artemis Mission.

Public support for the Apollo missions is widely misconceived; support was not as strong as many believe. In 1967, almost 28% of Americans thought the NASA budget should be reduced. This increased to 55% in 1975, after the completion of the Apollo missions. In fact, the only time more than 50% of the American population supported the expense of the Apollo program was in 1969, the year the Eagle landed (Talinn, 2010). Despite having a comprehensive understanding of NASA's space programs, between 1978 and 1999, 70% of the American public was favorable of NASA compared to the 20% that found it unfavorable (Launius, 2003).

A more recent study found that 72% of Americans feel it is essential for the U.S. to continue to be a world leader in space exploration, with 65% believing that NASA should still play a vital role in the exploration of space instead of private space companies (Funk & Strauss, 2018). This suggests that citizens think NASA should be leading space efforts, which requires NASA to handle the messaging and communication to the public.

However, only 13% of respondents thought that sending astronauts to the Moon should be a top priority for the organization (Funk & Strauss, 2018). This reveals that the public may not support Artemis sending humans back to the lunar surface, however, no studies can be found to identify support for NASA's next HSF mission, Artemis.

Statement of the Problem

While the Inspiration4 mission demonstrated significant public support for human spaceflight (HSF) and raised substantial funds for charity, the long-term sustainability of public enthusiasm for space exploration is uncertain. As NASA prepares to return astronauts to the lunar surface, it is crucial to understand the current public sentiment towards these missions and the factors influencing public support. Historically, public support for space exploration has been volatile and often influenced by events or milestones, such as the Apollo Moon landing in 1969.

The gap in current knowledge on public support raises questions about the extent of public support for NASA's Artemis mission. Understanding the factors influencing public sentiment towards space exploration is essential for ensuring sustained interest, justifying budgets, communicating with the public, and maintaining the momentum of advancements in space technology and exploration. By investigating these factors, this study aimed to provide a clearer picture of the public's perception of space exploration, enabling stakeholders to address concerns better and garner support for future HSF missions.

Purpose Statement

The purpose of the study was to bridge the knowledge gap on public support for NASA's Artemis missions, focusing on specific aspects of perceptions and attitudes that influence willingness to support. Through investigating underlying factors that are core to public opinion, the researcher aimed to identify key elements that influence, both positively and negatively, the public's support. This involved examining several factors including trust in government, future time perspective, familiarity with Artemis, attitudes towards space exploration, general risk propensity, perceived value, wariness of new technology, fun factor, affect, gender and age. Through the research, we seek to illustrate clear pathways through which support for Artemis can be improved, facilitating a more informed and engaged dialog around the mission.

Significance of the Study

The current study uniquely addressed the gaps in understanding public support for NASA's Artemis mission, offering invaluable insights that extend beyond traditional analyses for various stakeholders—NASA, the federal government, commercial space companies, and beyond. The current study uncovers the complex interworking of sentiments that drive public support toward space exploration. This multifaceted approach is a novel contribution to the field, far beyond the scope of existing studies to offer a comprehensive exploration of what drives support for Artemis. By discerning public sentiment and its underlying factors, key players can make more informed decisions, fine-tune communication strategies, and deeply understand the perspectives of the taxpayers who sustain their programs.

On a theoretical level, this study enriches the literature on space exploration by developing a theoretical model upon which future research can build, focusing on a deeper understanding of the social and psychological foundation of support for Artemis. This model incorporates a wide range of variables, providing a more holistic view of factors influencing support. On a practical level, the insights derived empower policymakers, funding bodies, and commercial entities in the space sector to devise outreach initiatives tailored to engage and educate the public. Such engagement is vital to foster broader enthusiasm for space exploration and address misconceptions or concerns that might undermine support for crucial missions.

Furthermore, this research deepens the scientific comprehension of the factors steering public support toward space initiatives like the Artemis mission. It lays a foundation for subsequent studies in this domain. Commercial entities, such as SpaceX and Blue Origin, also stand to gain, as a nuanced understanding of public perceptions toward NASA's ventures can inform their customer and stakeholder engagement strategies.

Research Question and Hypotheses

This section will detail the research questions and hypotheses of the current study.

Research Questions

The current study investigated two research questions:

RQ_1: What factors are associated with an individual’s support of NASA’s Artemis mission?

RQ_2: Did the findings from the calibration data get accurately replicated by the validation data set?

Hypotheses

The current study explored 12 hypotheses:

H_1: Trust in Government is positively associated with willingness to support Artemis.

H$_2$: An individual's affect score is positively associated with a willingness to support Artemis.

H$_3$: Future Time Perspective is positively associated with a willingness to support Artemis.

H$_4$: Familiarity with Artemis is positively associated with a willingness to support Artemis.

H$_5$: An individual's attitude towards space exploration is positively associated with a willingness to support Artemis.

H$_6$: General Risk Propensity is positively associated with a willingness to support Artemis.

H$_7$: Perceived Value is positively associated with a willingness to support Artemis.

H$_8$: Wariness of New Technology is negatively associated with a willingness to support Artemis.

H$_9$: Complexity Perception is negatively associated with a willingness to support Artemis.

H$_{10}$: Fun factor is positively associated with a willingness to support Artemis.

H$_{11}$: Males will be significantly more willing to support Artemis than females.

H$_{12}$: Younger individuals will be significantly more willing to support Artemis than older individuals.

Delimitations

The researcher imposed several delimitations on the current study to ensure the research could be completed. Surveying the entire U.S. population is infeasible. Therefore, the study focused on a representative sample of potential U.S. citizens that are likely to participate in the democratic process sourced via MTurk. The subsequent delimitation is the group of individuals targeted for the study. To ensure higher-quality data, the researcher applied filters in MTurk to target specific individuals. Participants had to be (a) 18 years or older, (b) U.S. citizens, (c) have completed at least 500 prior surveys, and (d) have a 98% or higher rating on their account. Finally, a cross-sectional design was used for data collection. As such, this study will only look at opinions at a specific time and will not explore trends over time.

Limitations and Assumptions

There are several limitations to the current study. The first significant limitation is the use of MTurk to collect data. Although MTurk provides a more representative sample of the U.S. population compared to traditional university subject pools (Paolacci & Chandler, 2014) or in-person convenience samples (Berinsky et al., 2012), it may not entirely reflect the demographics of the U.S. population. The collected demographic information will be compared to the most recent U.S. Census data to assess representativeness. Due to the convenience sample from MTurk, the generalizability of the study's findings may be limited to members of MTurk. However, follow-up studies could be conducted to expand generalizability.

The study collected attitudinal data instead of behavioral data, which could limit the direct applicability of the findings. Despite this, when combined with accepted social norms, attitudinal behavior can influence behavioral decisions (Ajzen, 1991; Ajzen & Fishbein, 1980; Ajzen et al., 2018). Therefore, the attitudinal data could be a predictor of the behaviors of the respondents.

The correlational research design presents several limitations to the study. Structural equation modeling (SEM) can test a hypothesized causal model but does not prove causation. The results provide evidence to accept or reject the hypothesized model and assess the strength and direction of the relationship. The cross-sectional design does not explore trends over time, limiting the ability to assess changes in public opinion. As data was collected at a single point, the differences in the groups could be attributed to a cohort effect rather than the variables being studied (Keyes et al., 2010).

Due to the exploratory nature of the research, several additional limitations apply to the research. Hypothetical scenarios developed for research may not accurately represent a real-life situation; therefore, the scenarios developed may not accurately indicate how a respondent would react to a real-life situation. A final limitation involves respondents who may answer questions based on social norms rather than honesty, introducing bias into the results. The researcher considered the potential for bias during analysis.

The researcher assumed all subjects would answer honestly. Data collection occurred on a third-party site, preventing the researcher from monitoring the subjects during the data collection. Establishing the delimitations ensures higher quality candidates for the survey and helps mitigate any potential dishonest subjects. It was also assumed that the participants would follow the directions in the instrument. A pilot study ensured the questionnaire was well-written and understandable by participants before the full data collection.

Summary

Chapter I highlighted the resurgence of interest in human spaceflight, particularly in light of the 50th anniversary of the last lunar landing and the ambitious goals of NASA's Artemis mission. The chapter discussed the statement of the problem, the purpose statement, and the significance of the study. Next, the research questions and hypotheses were outlined. Finally, the chapter discussed the delimitations, limitations, and assumptions of the current study. Chapter I concludes with the definition of terms and a list of acronyms central to the study.

Definitions of Terms

Artemis	A NASA-led mission aiming to land the first woman and the next man on the Moon by 2024 and establish sustainable lunar exploration by the end of the decade (Adams, 2021).
Future Time Perspective	An individual's outlook on their future (Carstensen & Lang, 1996).
General Affect	An individual’s emotional response to various scenarios (Rice & Winter, 2015).
Human Space Flight	The transportation of humans into space using spacecraft designed to sustain human life while traveling beyond Earth's atmosphere (Dunbar, 2021).

Perceived Value	"the consumer’s overall assessment of the utility of a product based on perceptions of what is received and what is given” (Zeithaml, 1988, p. 14).
Willingness to Support	An individual's inclination or readiness to endorse, promote, or provide resources for a specific cause, project, or organization (Winter & Trombley, 2019; Winter et al., 2019).

List of Acronyms

ACI	Active Citizen Involvement
AMOS	IBM ® SPSS Analysis of Moment Structure Graphics ® v.27
AVE	Average Variance Extracted
CFA	Confirmatory Factor Analysis
CFI	Comparative Fit Index
CR	Composite Reliability
C.R.	Critical Ratio
FCI	Faith In Citizen Involvement
FTP	Future Time Perspective
GRiPS	General Risk Propensity Scale
HQ	Human Quality
HSF	Human Space Flight
IC	Innovation and Creativity
IRB	Institutional Review Board
MSV	Maximum Shared Variance

MTurk	Amazon's ® Mechanical Turk ®
NASA	National Aeronautics and Space Administration
PSP	Public-Sector Performance
RMSEA	Root Mean Square Error of Approximation
SEM	Structural Equation Modeling
SMCs	Squared Multiple Correlations
SPSS	IBM ® SPSS Statistics ® version 28
SRMR	Standardized Root Mean Squared Residual
TAM	Technology Acceptance Model
UTAUT	Unified Theory of Acceptance and Use of Technology
WTF	Willingness to Fly
WTP	Willingness to Pay
WTS	Willingness to Support

Chapter II: Review of the Relevant Literature

Chapter II provides a literature review that served as the basis for the current study. The review starts with a brief history of Human Space Flight (HSF), highlighting the major HSF programs and historical support. The gaps in the literature are then presented with the theoretical foundation to ground this study in literature. Finally, the selection and justification of hypotheses and variables are presented.

A Brief History of Human Space Flight

On March 16, 1926, Robert Goddard successfully launched the first liquid-filled rocket (Marconi, 2004). For HSF, the date is comparable to the Wright brothers' first flight on December 17, 1903. At the same time, Hermann Oberth was developing similar technology in Germany. Between 1936 and 1942, Germany developed the first large-scale liquid-filled rocket, the V2, for combat purposes. Wernher von Braun, a German military officer and student of Hermann Oberth, was the brainchild behind the successful V2 program.

The V2 program did not sway the course of World War II, and Germany quickly lost the war. Von Braun realized that Germany would fall and decided to surrender to the Americans on May 2, 1945. Although he was a German military officer, the United States was interested in the V2 technology and enlisted Von Braun's help through Operation Paperclip. Operation Paperclip was an Army-led project to better understand the V2 rocket and its technology by acquiring German scientists after World War II (Green & Lomask, 2012; Harbaugh, 2017). In 1950, Von Braun and his team relocated to Redstone Arsenal in Huntsville, Alabama, to design and develop the Army's Redstone and Jupiter ballistic missiles and other systems essential to HSF.

The Space Race officially began on October 4, 1957, when the Soviet Union successfully launched the first satellite into orbit. The general concern of the population and its elected officials was more focused on what America had not accomplished rather than what Russia did accomplish (Green & Lomask, 2012). The launch of Sputnik ultimately forced the U.S. government to expedite the Vanguard program and attempt to match the Soviets' accomplishments. On December 6, 1957, the United States' first attempt to launch a satellite ended in a catastrophic explosion, furthering the country's embarrassment.

Meanwhile, von Braun's team in Huntsville successfully launched two successful Jupiter-C rockets in 1957. Von Braun argued that the Jupiter-C rocket was ready and able to meet the Soviets' historic feat (Mohon, 2018). On the evening of January 31^{st}, 1958, the Jupiter-C successfully launched from Cape Canaveral. It deployed Explorer 1 (Mohon, 2018), matching the accomplishments of the Soviets and easing the minds of the United States population. President Dwight D. Eisenhower established NASA in July of that year, which would begin operations on October 1^{st}, 1958.

Mercury

Only six days after NASA began operations, Project Mercury was announced on October 7, 1958, as the project that would send an American into space. The project had three primary objectives: (1) to orbit a crewed spacecraft around Earth; (2) to investigate a human's ability to function in space; and (3) to recover both the human and spacecraft safely (Loff, 2017). The selection process for the first astronauts was a closely guarded secret. On April 9, 1959, the Mercury 7 astronauts were introduced at a press conference in Washington, D.C. After the press conference, the astronauts realized their lives would be on public display due to the high visibility of Project Mercury. More so, the wives of the first seven would rocket to fame and become significant figures in American pop culture (Maksel, 2013).

As final testing was being conducted to ensure the safety of the inaugural flight, the Soviets delivered a blow to the American project. On April 12, 1958, Yuri Gagarin made history by becoming the first human in space aboard the Vostok capsule, completing a single orbit (Dunbar, 2017). The Americans were able to respond, and on May 5, 1961, Alan Shepard successfully rode Freedom 7 into space on top of a modified Mercury-Redstone rocket from Cape Canaveral. Estimates of the public's interest in this historical feat recount that approximately 500,000 people were in the area for the launch, and about 45 million Americans watched it from their televisions (Dunbar, 2017).

Gemini

The next major program in HSF was dubbed Gemini and was announced on January 3, 1962. The Gemini program had four primary goals: (1) test an astronaut's ability to fly long-duration missions (up to two weeks in space); (2) understand how spacecraft could rendezvous and dock in orbit around the Earth and the moon; (3) perfect re-entry and landing methods; and (4) further understand the effects of longer space flights on astronauts (Williams, 2004). The same year, on September 12, 1962, President John F. Kennedy made his famous Rice University speech and charged the United States with landing a man on the moon before 1970 (Rice University, n.d.).

The Gemini program demonstrated that the requirements to land a man on the moon for Apollo's success could be accomplished. Several training incidents highlighted the dangerous nature of being an astronaut to the public. Before the first Gemini launch on October 31, 1964, Theodore Freeman was killed when his T-38 crashed after a bird strike (Granath, 2017). Another blow to the Gemini program happened when Elliot See and Charles Bassett, who were the primary crew for Gemini 9, died when their T-38 crashed while attempting to visit the McDonnell Aircraft Hanger, where their capsule was being built (Mars, 2021). Sadly, these losses would not be the only ones in the history of HSF.

Apollo

The culmination of the Mercury and Gemini programs ushered in a new era of HSF with a target on the Moon. However, things would not go as smoothly as the previous two programs. On January 27, 1967, tragedy struck. During a routine prelaunch test, Apollo 1 astronauts Gus Grissom, Edward White, and Roger Chaffee died after a fire broke out in the Apollo command module (Garber, 2015). The fire resulted in a 20-month suspension of the Apollo Program and a tighter window to meet President Kennedy's goal of landing on the Moon.

The Apollo 11 lunar landing was watched by an estimated 650 million people and held the record for the largest television audience until 1981 (Nuyen, 2019). The Apollo 13 mission crisis brought about a surge of public interest. The United States Information Agency said that the coverage of the Apollo 13 landing surpassed the interest of the lunar landing. Additionally, NASA used lessons learned during the Apollo 1 fire to react to media inquiries quickly and accurately (Kauffman, 2001). It could be argued that the handling of the Apollo 13 crisis improved NASA's image and proved to Congress and the public that they could handle anything that came their way.

Space Shuttle Program

As the Apollo program neared completion, President Nixon approved the Space Shuttle program on January 2, 1972. The first launch was conducted on April 12, 1981, and would fly 135 missions over 30 years of service. The iconic shuttle has been ingrained in the U.S. public's mind throughout its historic tenure. Historically, public opinions over the years reveal that between 59% and 80% of the public supported the continuation of the shuttle program, even throughout the accidents (Roper Center Data, 2015). The two significant accidents in the Space Shuttle Program involved the Challenger and the Columbia.

Challenger Accident. On the chilly morning of January 28, 1986, seven astronauts launched aboard Space Shuttle Challenger only to be met with a catastrophic failure after 73 seconds, resulting in the death of all aboard. This became the first in-flight catastrophic accident in U.S. spaceflight's history, sending shock waves through the nation. Despite the loss of the astronauts and the setback to the U.S. space program, public support for the space program did not waiver before, during, or after this event.

According to a cross-sectional study conducted by Miller (1987), there was a positive gain in public opinion and support after the accident. Miller found that prior to the accident, the public had a solid foundation of confidence in the program, and the short-term effect of the accident increased the U.S. public's pride in the program. In his findings, he says that most Americans found it to be a minor setback and anticipated a return to flight in only a few months. He concludes that his research revealed that the net effect of the Challenger accident was a substantial positive shift for the space shuttle and the program.

Columbia Accident. After 17 years of successful HSF activities, NASA would lose seven more astronauts to another tragic accident. On February 1, 2003, as the Columbia began its reentry into Earth, it broke apart across the skies of Texas, to the horror of the U.S. public. The cause of the accident was a piece of foam that broke off during launch, causing a hole to appear in the shuttle's wing. After this accident, public opinion of the shuttle program were at a record low (Roper Center Data, 2015). The accident, combined with the excessive cost, slow relaunch time, and lack of customers, made the George W. Bush administration announce the retirement of the Shuttle program in 2004. The final flight of the Space Shuttle occurred on July 8th, 2011.

Artemis

Central to the study, NASA's current HSF program is Artemis. Artemis is NASA's new program to return astronauts to the moon. The goal of Artemis is to land the first woman and the first person of color on the lunar surface. NASA has touted Artemis as a bridge to Mars as humankind aims to establish a sustainable human presence on the Moon (Adams, 2021). The Artemis mission has been plagued with cost overruns and schedule delays that have increased the price to the taxpayer. The NASA Office of Inspector General found that the Artemis mission will cost $93 billion between 2012 – 2025, with each launch costing $4.1 billion (O'Brien, 2022), despite its original $10-billion-dollar budget (Train, 2022).

The cost and schedule overruns could influence polling data for priorities. It's reasonable to think that those who understand the cost overruns could think that the priority should be lower due to a cost-benefit analysis. Recent poll data suggest that Americans largely believe that the U.S. must remain a leader in space exploration.

However, Americans feel that sending astronauts back to the moon is the lowest priority of proposed NASA missions (Funk & Strauss, 2018; Johnson, 2019). A similar result was found in a 2021 survey that found sending humans to the Moon or Mars was the lowest priority of proposed NASA missions (Morning Consult, 2021). Little to no research has been conducted to explore public perceptions of NASA's Artemis mission.

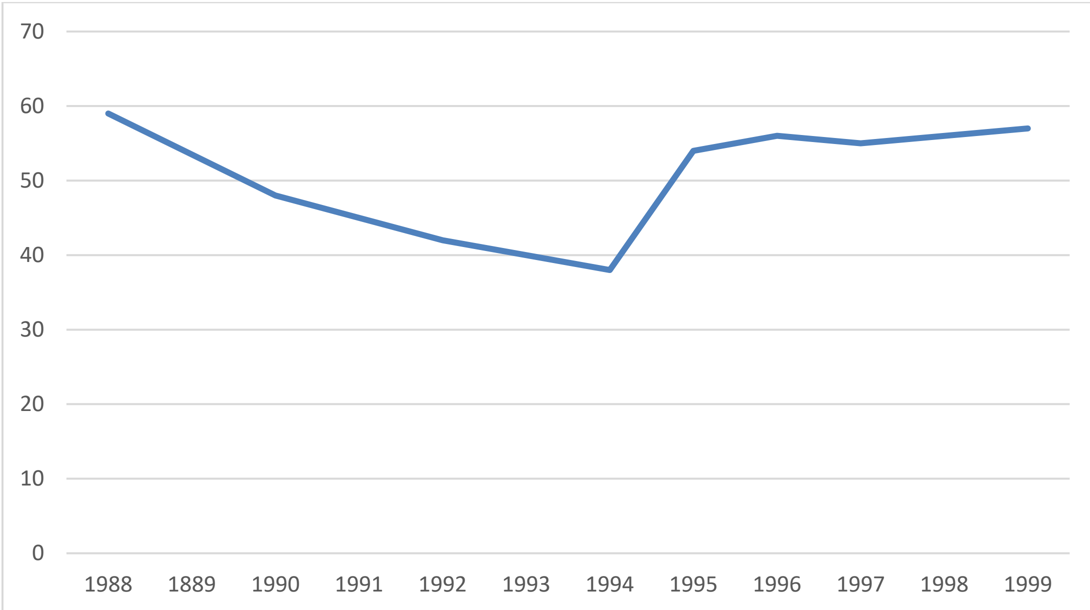
Support for Human Space Flight

NASA is set to send astronauts back to the lunar surface in 2024 – delayed until September 2026 (Donaldson, 2024). Public support for the Apollo missions is widely misconceived; support was not as strong as many believe. In 1967, almost 28% of Americans thought the NASA budget should be reduced. This percentage increased to 55 in 1975, after the completion of the Apollo missions. In fact, the only time more than 50% of the American population supported the expense of the Apollo program was in 1969, the year the Eagle landed (Launius, 2003; Talinn, 2010).

Despite a lack of knowledge of NASA’s space program, between 1978 and 1999, 70% of the American public was favorable of NASA compared to the 20% that found it unfavorable (Launius, 2003). Additionally, when asked how important the space program is to the United States, there has been consistent support, with an uptick in 1995, as shown in Figure 1.

Figure 1

Importance of Space Program to the American Public, 1988 – 1999

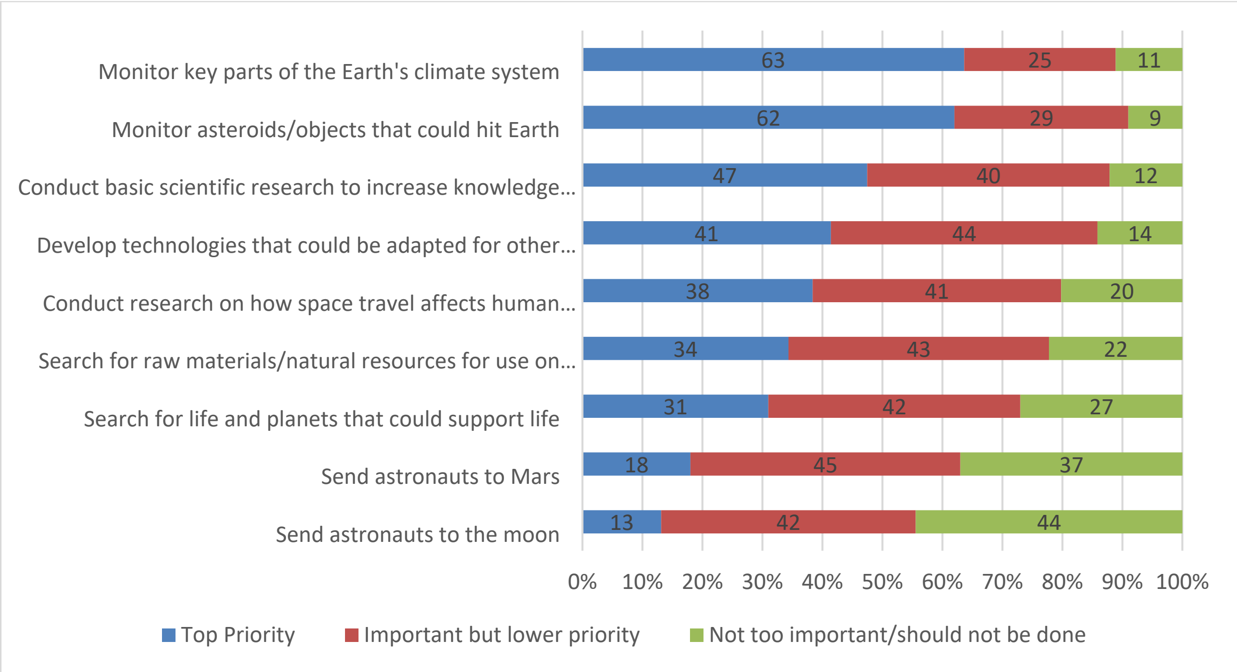


Note: Created from "Public Opinion Polls and Perceptions of US Human Spaceflight," by R.D. Launius, 2003, *Space Policy*, *19*(3), 163–175 (https://doi.org/10.1016/S0265-9646(03)00039-0).

More recently, Funk and Strauss (2018) found that 72% of Americans feel it is essential for the U.S. to continue to be a world leader in space exploration, with 65% believing that NASA should still play a vital role in the exploration of space instead of private space companies. While these numbers show strong support for NASA, it does not show the entirety of where the support lies. Figure 2 shows nine priorities for NASA and their rating among participants.

Figure 2

Top Priorities for U.S. Adults for NASA



Note: Created from "Majority of Americans Believe It Is Essential That the U.S. Remain a Global Leader in Space" by C. Funk and M. Strauss, 2018, Pew Research Center (https://www.pewresearch.org/science/2018/06/06/majority-of-americans-believe-it-is-essential-that-the-u-s-remain-a-global-leader-in-space/).

The priorities from the 2018 study found strong support in many areas. However, only 13% of respondents thought that sending astronauts to the moon should be a top priority for the organization. The low support may be because respondents were asked to rate all nine priorities simultaneously. However, it may reveal that Americans have lower public support for Artemis than other NASA missions.

Gaps in the Literature

There is a current lack of knowledge on the public's support for NASA and the Artemis missions. More so, factors influencing the public's support are an unexplored topic. Several gaps in the literature point to the public's lack of awareness about the mission. Despite NASA broadcasting and attempting to reach out to the public about Artemis, there seems to be an issue relaying the benefits of the mission to the public. An increased understanding of the mission and its benefits could have a positive effect on willingness to support. Another literature gap is that the U.S. population generally does not know how much NASA's Artemis mission will cost the taxpayers. It is possible that taxpayers with little understanding of the federal budget process may be less willing to support NASA when they hear a large dollar amount associated with it. However, NASA's entire 2023 budget accounts for only 0.1% of the U.S. federal budget (USA Spending, 2022).

No current research could be found that explores the public's Willingness to Support (WTS) NASA's Artemis mission. Since there is no recent research on the topic, the researcher leveraged the willingness studies that have been conducted on various topics in the aviation and aerospace industry. In reviewing the literature on willingness, several reoccurring themes were identified to leverage for the current study.

Theoretical Framework

The theoretical foundation for the current study builds on a study by Vigoda (2002). Vigoda (2002) tested several models to expand on the democratic theory (Pateman, 1970) that suggests people should be involved in the process of governing themselves. Vigoda (2002) used structural equation modeling (SEM) to explore the relationship between public-sector performance (PSP) and citizenship involvement. The involvement explored two separate types of involvement, active citizen involvement (ACI) and faith in citizen involvement (FCI), which were the study's dependent variables. Vigoda (2002) defines ACI as people's engagement in activities such as voting, supporting, protesting, demonstrating, or petitioning political activities. Faith in citizen involvement explores the attitudes toward democracy and is defined as how much people think an average citizen can affect changes in a political system (Vigoda, 2002). The model used three independent variables, PSP, human quality (HQ), and innovation and creativity (IC). PSP explores a citizen's satisfaction with service and operations, HQ explores the quality of employees and leadership, and IC explores if the agency is adaptable and capable.

Vigoda (2002) found that perceptions of public service operation positively influenced PSP and FCI, FCI positively influenced ACI but was negatively influenced by PSP, creating a paradoxical effect of PSP on ACI. Vigoda (2002) suggests that public sector performance contributes to developing attitudes and opinions that support democracy. Further, individuals who have higher levels of satisfaction with governmental operations are stronger believers in the processes of the government and feel they can influence the processes. Vigoda (2002) goes on to say that the paradox may exist because individuals who feel they can influence the governmental agencies, but do not need to use their voice if the agency is being operated correctly, may need to speak out in times of agency mismanagement. The paradox could be rooted in the public's willingness to support the agencies.

Recent studies have examined willingness in several different aspects among the aviation domains. Merriam-Webster (n.d.) defines *willing* as inclined or favorably disposed of in mind; prompt to act or respond; done, borne, or accepted by choice or without reluctance; or of or relating to the will or power of choosing. For example, several studies have explored willingness to fly, willingness to pilot, willingness to pay, willingness to ride, and willingness to support. Each modification has resulted in many other studies that can be used better to explore willingness over a wide variety of subject areas. Thus, it has created a broad spectrum of literature used to justify the predictors of the current study. An exhaustive review of willingness studies was conducted to find commonalities in the research. Table 1 highlights the common predictors found throughout the studies.

Table 1

Predictors Found in Literature by Type of Study

Predictor	WTS	WTP	WTF	Other Willingness
Affect	x	x	x	x
Familiarity	x	x	x	x
Perceived Value	x	x	x	x
Gender	x	x	x	x
Wariness of New Technology	x		x	x
Fun Factor	x		x	x
Age	x		x	x
Future Time Perspective	x			x
Complexity Perception			x	x
General Risk Propensity			x	x
Trust in Government			x	x
Attitude Towards				x

In conjunction with the Vigoda (2002) study and the grounding in the literature of willingness studies, these concepts served as the basis for the hypothesized model for the current study.

Willingness

Central to the current study is the term willingness. The term generally is defined by the state of being prepared to do something. For over a century, willingness has been used as a metric for scientific research in all fields to explore complex human behaviors. Willingness in aviation can be separated into four major areas of research: Willingness to Support (WTS), Willingness to Pay/Purchase (WTP), Willingness to Fly (WTF), and other willingness studies. The following sections will highlight several willingness studies and their findings.

Willingness to Fly. WTF is, perhaps, the most studied of the willingness categories, with multiple scenarios researched. These scenarios include WTF in autonomous aircraft (Mehta et al., 2019), gender differences in the flight crew (Mehta et al., 2017), and other scenarios. Numerous studies have explored WTF under various conditions, such as weather (Beringer & Ball, 2003; Knecht, 2005; Knecht et al., 2005), gender of the crew (Mehta et al., 2017), and if the pilot is taking medicine (Rice et al., 2015), using the WTF scale.

A 2015 study by Rice et al. explored how depression medications affect a passenger’s WTF, finding that participants were less willing to fly with medicated pilots. Affect mediated three of the four scenarios, revealing that consumers were basing their ratings on their emotional responses to the medicated pilot. A 2017 study explored consumer perceptions towards the federal flight deck officer program and WTF. The findings indicated that participants were more willing to fly when their pilot was armed (Winter et al., 2017). As with previous studies, affect mediated the relationship between their condition and WTF.

Rice and Winter (2019) explored whether gender and age affected an individual's willingness to ride in an autonomous vehicle. Several scales were developed and validated by the researchers for the study, including the complexity perception scale, the familiarity scale, value scale, fun factor scale, and wariness of new technology scale. Gender was a significant predictor in all three studies, with females being less willing to ride than males. The post-hoc analysis found that gender and fear were mediated by complexity, value, and fun. A 2020 study explored factors to predict a consumer's WTF during and after the COVID-19 pandemic. Lamb et al. (2021) found that perceived threat from COVID-19, agreeableness, affect, and fear were significant predictors.

Several themes have emerged through the literature for willingness studies. Affect was significant in almost every study (Lamb et al., 2021; Rice et al., 2015; Rice & Winter, 2019; Winter et al., 2019; Winter & Trombley, 2019). Value was a theme in several studies (Crouse et al., 2021; Rice & Winter, 2019; Winter et al., 2019), suggesting that consumers' willingness is tied to their perceived value of what is being researched.

Willingness to Support. Winter and Trombley (2019) surveyed 536 participants to identify significant predictors of individuals willing to travel and live on Mars. Researchers found nine statistically significant predictors explaining over 61% of the variance: familiarity, fun factor, wariness of new technology, anger, disgust, happiness, sadness, ethnicity, and education. Of interest from these findings was that as individuals became more wary of new technology, they were more willing to travel and live on Mars.

Additionally, those with a master's degree were less willing. Winter et al. (2019) surveyed 514 participants through four scenarios to determine a consumer's WTS environmental sustainability in aviation. The researchers found seven significant predictors of WTS, explaining between 29% and 41% of the variance: value, affect, environmental commitment, perceived consumer effectiveness, happiness, age, and familiarity.

Willingness to Pay. WTP explores consumers' behaviors and intentions and can be used to estimate prices for a service rendered or an item offered. Willingness studies are more reliable when given as indirect surveys as the direct questioning of participants has been shown to be inaccurate (Breidert et al., 2006). Indirect surveys apply a rating or ranking procedure for the item or service in question, whereas direct surveys ask how much they would be willing to pay for the item or service. Various researchers discuss that direct surveys have distorted effects and can result in misleading data (Balderjahn, 2003; Nagle & Holden, 2017).

Crouse et al. (2021) explored predictors for a consumer's WTP for a subscription-based airline program. The researchers surveyed 521 participants and found three significant predictors explaining over 77% of the variance: if they typically pay for early boarding, employment, and perceived value. Another study by Walters et al. (2018) surveyed over 1,100 participants to determine if they were willing to pay for new airports that use renewable resources. The researchers found that consumers were more willing to pay for green airport initiatives, and affect mediated the relationship between the type of airport and a consumer's WTP.

Other Willingness Studies. Some examples of other willingness studies focus on willingness to ride in a driverless ambulance or bus (Rice & Winter, 2019; Winter et al., 2018) and willingness to ride in driverless vehicles (Anania, Mehta et al., 2018; Anania, Rice et al., 2018; Mehta et al., 2021; Milner et al., 2021). Several common factors were found throughout the studies.

Gender effects were present as females were less likely to ride in or use newer autonomous technology (Anania, Rice et al., 2018; Mehta et al., 2021; Milner et al., 2021; Rice & Winter, 2019; Winter et al., 2019). Affect was a significant predictor in several studies (Anania, Mehta et al., 2018; Anania, Rice et al., 2018; Mehta et al., 2021; Milner et al., 2021; Rice & Winter, 2019; Winter et al., 2018), often mediating relationships. For example, gender and willingness to ride in an autonomous vehicle were mediated by fear, anger, and happiness (Rice & Winter, 2019). This finding was replicated by Mehta et al. (2021), which found that fear and happiness mediated the relationship between gender and willingness to ride in an autonomous cruise ship. Winter et al. (2018) found that females' willingness to ride was mediated by anger, whereas males' willingness to ride was mediated by happiness. Other common factors that were significant in the studies were fun factor (Milner et al., 2021; Rice & Winter, 2019), perceived value (Anania, Mehta et al., 2018; Milner et al., 2021), wariness of new technology (Anania, Mehta et al., 2018; Milner et al., 2021), familiarity (Anania, Rice et al., 2018; Milner et al., 2021; Rice & Winter, 2019; Winter et al., 2018), and complexity perception (Milner et al., 2021; Rice & Winter, 2019).

Trust in Government

NASA, a civilian government agency, leads the Artemis mission. Trust in an agency is paramount for individuals who want to support the company and its products. Trust can be explored through the Grimmelikhuijsen and Knies (2015) study that breaks trust in government into three categories: competence, benevolence, and integrity. Public trust in government is a widely researched area typically measured through a single-item scale of political trust (Grimmelikhuijsen & Knies, 2015; Hooghe, 2011; van de Walle et al., 2004). While a single-item scale could capture a citizen's trust in government, it would likely capture generalized trust instead of trust in a specific organization, such as NASA (Bouckaert & van de Walle, 2003; van de Walle et al, 2004).

Grimmelikhuijsen and Knies (2015) highlighted that across domains, two primary elements are relevant to trust: a degree of risk and interdependence (Bachmann, 2011; Fisher et al., 2010; Hardin, 1993; Lewicki & Bunker, 1995; Lewicki et al., 1998; Mayer et al., 1995; McAllister, 1995). Ultimately, in the case of NASA, the citizens would experience risk due to the uncertainty that the agency is carrying out what they are charged with doing. Additionally, the risk may manifest through a citizen's interpretation of how NASA uses the taxpayer's money to fund its programs. Interdependence creates a symbiotic relationship between the citizens and NASA. NASA relies on the citizens for funding, and the citizens expect their money to be used to solve real-world problems.

With both risk and interdependence present, trust can then be defined as "the willingness of a party to be vulnerable to the actions of another party based on the expectation that the other will perform a particular action important to the trustor, irrespective of the ability to monitor or control that other party" (Mayer et al., 1995, p.

712). Further, Grimmelikhuijsen and Knies (2015) explored trust through three dimensions. The first is perceived competence, which asks the citizens if the organization is capable, effective, skillful, and professional. Next, perceived benevolence asks if the organization cares about the welfare of its population and acts in its best interests. Finally, perceived integrity explores if the organization is sincere, truthful, and fulfills its promises. The current study used the Trust in Government Scale (see Appendix C) developed by Grimmelikhuijsen and Knies (2015).

Affect

Affect explores emotional responses to various scenarios. The current study explored if an individual's emotional response to the Artemis mission would influence their willingness to support. Affect has been identified to play a significant role in an individual's decision-making process (Angie et al., 2011; Dickert, 2009; Diener & Emmons, 1984; Isen & Means, 1983; Raghunathan & Pham, 1999; Watson et al., 1988). A consumer's decision-making process involves mental calculations that assess losses to gains (Wickens et al., 2021) while focusing on loss aversion and prioritizing losses (Gärling, 1989; McGraw et al., 2010). For NASA's Artemis mission, one may overestimate the negative risk of the mission and underestimate any positive outcome of the mission, resulting in lower support.

Affect has been shown to mediate and predict consumer behaviors in several studies (Anania, Mehta, et al, 2018; Anania, Rice, et al., 2018; Bergstrom & McCaul, 2004; Crouse et al., 2021; Hohenberger et al., 2016; Lamb et al., 2021; Mehta et al., 2021; Rains et al., 2017; Ragbir et al., 2021; Winter et al., 2017; Rice & Winter, 2015b, 2019; Winter et al., 2015, 2017). Affect has been shown to mediate an individual's knowledge of a subject and willingness to pay (Ragbir et al., 2021). Emotional responses can also result in quick decisions by an individual when little information about the subject is known (Alhakami & Slovic, 1994). This could be why Winter and Rice (2015) found that airline passengers judge pilots based on their initial emotional response during interactions instead of relying on the pilot's specific skills.

Winter and Trombley (2019) found several affective emotions influencing an individual's willingness to travel and live on Mars. Other studies found that emotional responses influenced an individual's willingness to support and pay for green initiatives (Walters et al., 2018; Winter et al., 2019; Winter et al., 2021). The current study explored affect using the general affect scale (see Appendix C) developed by Rice and Winter (2015). The scale has been used in several studies to identify the emotional responses of individuals in various scenarios.

Future Time Perspective

An individual's Future Time Perspective (FTP) could significantly affect how they support specific programs or technologies, particularly if they could improve an individual's perspective. Carstensen and Lang (1996) developed the FTP scale to address how individuals view their future. FTP is focused on the individual's perception of time, not literal time (Husman & Shell, 2008). Since time is not an unlimited resource for an individual, their perceptions and attitudes change as they age. Individuals who are aware of their mortality in their later years are more focused on emotional gratifications instead of individual desires (Kessler & Staudinger, 2009). Several studies have revealed that an individual's FTP average score decreases as they age (Coudin & Lima, 2011; Grühn et al., 2016; Lang & Carstensen, 2002; Sharifian, 2017).

Winter et al. (2021) explored factors influencing WTP for sustainability and intention to act. While the study found no support that FTP directly influenced an individual's WTP, there was a non-hypothesized interaction between FTP and intent to act. The authors argued that the study participants viewed climate change as a challenge to their future and were more willing to act against climate change rather than financially supporting other agencies to manage the task for them. Additionally, they suggested that since their participants' age (M = 40.08 SD = 13.00) was lower, they could have a higher FTP than older individuals, leading to a lack of support. Additionally, individuals who feel that humans must become an interplanetary species may have a higher FTP and be more concerned about supporting programs that could improve their future.

Familiarity with Artemis

Individuals more familiar with a subject may be more willing to support said subject. The Artemis mission has been at the forefront of news and social media. As such, repeated exposure to something can cause a form of conditioning to individuals that positively influences those individuals on the subject area (Zajonc, 2001). Familiarity can also affect how an individual invests their financial resources. De Vries et al. (2017) found that investors exhibit familiarity bias when selecting their investments. These individuals may feel more willing to support the companies through investment the more familiar they are with the company and its products.

Familiarity can breed support for a cause, particularly if an individual or company is the driving force for its familiarity. The teenage climate activist Greta Thunberg gained notoriety and fame as she challenged world leaders to take climate change more seriously. Sabherwal et al. (2021) explored the "Greta Thunberg Effect" to find out if exposure to Greta can predict an individual's intention to act to reduce global warming. The researchers found that individuals more familiar with Greta Thunberg were more likely to act against global warming. It may be possible that a similar "NASA Effect" would be present for those more familiar with NASA. Familiarity was present in several willingness studies (Anania, Rice et al., 2018; Milner et al., 2021; Rice & Winter, 2019; Winter et al., 2018).

Rice et al. (2019) wanted to address issues they found with the Technology Acceptance Model (TAM) by Davis (1985). The researchers identified discrepancies in the literature and the length of the published TAM scales. The length of the published scales could result in nonresponse or acquiescence biases. Therefore, Rice et al. (2019) created and validated five new scales to address the issues they found with the TAM. The five scales created were complexity, familiarity, value, fun factor, and wariness of new technology. The current study used the familiarity scale (see Appendix C).

Attitude Towards Space Exploration

Attitudes can have a dramatic effect on support for a product or service. An attitude is how someone thinks or feels about something, reflected in their behaviors. It is generally believed that the Apollo Generation was more supportive of NASA than today’s younger generations; however, support is high among Generation X and Y and the Apollo Generation (Nadeau, 2013). The attitudes that individuals form can lead to supporting an endeavor. NASA frequently broadcasts real-time launches with live commentary as a form of outreach to improve the public opinion of their missions. A study by Anania, Rice et al. (2018) found that participants given negative information were less willing to ride in autonomous vehicles than those given positive information.

This interaction may show how ensuring a positive message can impact an individual's attitude toward technology.

A study by Entradas et al. (2013) explored the United Kingdom's public support for space exploration. The authors found that most respondents (86%) found space to be very risky, while fewer than half (42%) agreed that there are more important things to solve on Earth than in space. Researchers used a four-question scale to capture participants' attitudes towards space exploration (see Appendix C for full scale). There were also gender effects in the study; men were more positive than women towards space exploration and willing to spend more money and increase the risk to accomplish the missions.

Perceived Value

Perceived value is “the consumer’s overall assessment of the utility of a product based on perceptions of what is received and what is given” (Zeithaml, 1988, p. 14). An individual's perceived value can help predict actual user behavior as it indicates how useful the product or service is to the consumer. The TAM and Unified Theory of Acceptance and Use of Technology (UTAUT) found that an individual's perceived usefulness of technology is a strong predictor of actual behaviors (Venkatesh et al., 2003). Perceived Value has been found to be a predictor in several willingness studies (Anania, Mehta et al., 2018; Crouse et al., 2021; Milner et al., 2021; Rice et al., 2019; Rice & Winter, 2019; Winter et al., 2019; Winter et al., 2021). The current study used the Perceived Value scale (see Appendix C) adapted from Zeithaml (1988).

Wariness of New Technology

December 14th, 2022 marked the 50th anniversary of the last time a NASA astronaut walked on the Moon. Surprisingly, Western society has developed more technology in the last 50 years than over the previous 200 years (Berman, 2016). This means that the Space Program has developed more in the 50 years since we have been to the Moon than it took to get there in the first place. The rapid evolution of technology can have negative consequences for the support and acceptance of the technologies.

NASA's Artemis mission is a technology-based mission using new technologies and procedures never seen. As individuals are presented with new technology, they use their decision-making process to focus on safety, risk, and reliability. This decision-making process can affect their willingness to use the latest technology or, perhaps, support their use of the technology (Lee & Moray, 1992; Lee & See, 2004; Merritt & Ilgen, 2008; Muir, 1987; Riley, 1989). Wariness of New Technology was a predictor in several willingness studies (Anania, Mehta et al., 2018; Milner et al., 2021; Rice et al., 2019; Rice & Winter, 2019; Winter et al., 2020). The current study used the Wariness of New Technology scale (see Appendix C) developed by Rice et al. (2019).

Complexity Perception

The more complex something is, the less likely individuals are willing to use the item. The development of the TAM found that ease of use affects technology usage (Davis, 1985). Additionally, the author found that perceived ease of use has a causal effect on perceived usefulness, suggesting that the easier something is to use, the more likely it will be deemed useful by the participant. It is understandable that complex systems that require much effort to understand could be more user-friendly and may require effort from the individual to understand the technology.

Artemis will use several automated technologies to achieve its mission. Automated technologies that are used by highly sophisticated systems may be discouraging to individuals (Lee & See, 2004). Discouraging messaging may be present in the current study as Artemis is a highly complex mission with several new technologies. Individuals may be overwhelmed with the information, increasing their perception of complexity. Complexity Perception was explored in several willingness studies (Anania, Mehta et al., 2018; Rice et al., 2019; Rice & Winter, 2019). The current study used the Complexity Perception scale (see Appendix C) developed by Rice et al. (2019).

General Risk Propensity

The Merriam-Webster Dictionary (n.d.) defines *risk* as (1) possibility of injury; (2) someone or something that creates or suggests a hazard; (3) the chance of loss or the perils to the subject matter of an insurance contract; or (4) the chance that an investment (such as a stock or commodity) will lose value. Risk is inherent in HSF with the Apollo 1, Space Shuttle Challenger, and Space Shuttle Columbia space disasters as examples. The three accidents resulted in the loss of 17 lives and negative press for NASA that questioned the justification for the program. The accidents revealed to the public how much was at risk during these missions. Researchers have argued that risk-taking is domain-specific without being able to cross-domains (Figner & Weber, 2011; Hanoch et al., 2006). For example, some may be risk-seeking in the financial domain (e.g., willing to gamble) but be risk-averse in other recreational domains (e.g., mountain biking).

The psychometric perspective of risk shows that it is subjective and that qualitative features of that risk will guide perceptions (Jenkin, 2006). Additionally, the severity and likelihood of loss or harm are examined during an individual's decision-making process while assessing risk (Byrnes et al., 1999; Furby & Beyth-Marom, 1992; Steinberg, 2008). Therefore, general risk-taking propensity is " a person's cross-situational tendency to engage in behaviors with a prospect of negative consequences such as loss, harm, or failure" (Zhang et al., 2018, p. 153). Zhang et al. (2018) developed the General Risk Propensity Scale (GRiPS) to provide a tool to explore the nature of risk-taking as a general disposition. It could be argued that those willing to engage in risky behaviors would be more willing to support a risky endeavor. The current study used GRiPS, and it can be found in Appendix C.

Fun Factor

Usability has always been a concern for systems engineers during the development of a system. As stated earlier, Davis (1985) found that ease of use affects technology usage. Hedonics are experiences of pleasure and displeasure that guide behaviors and affect decision-making (Becker et al., 2019). As individuals experience fun, they can activate their mesolimbic pathway, a region in the brain associated with pleasure (Becker et al., 2019; Panksepp, 2007). Activating this pathway releases dopamine and could lead individuals to continue to use or support something for the dopamine reward. Fun factor was a significant predictor in several willingness studies (Baugh et al., 2018; Milner et al., 2021; Rice et al., 2019; Rice & Winter, 2019; Winter & Trombley, 2019). The current study used the Fun Factor scale (see Appendix C) developed by Rice et al. (2019).

Demographic Variables

Gender. Research has shown that men and women use technology differently. Additionally, women often see themselves as less capable of using technology than males (Sobieraj & Krämer, 2020). A recent survey found that men (*n* = 2,050, males = 1,148, females = 902) were more interested in traveling to space than women (DeMarco & Wright, 2021). This could be because males are generally more willing to engage in risky behaviors than females (Byrnes et al., 1999; Powell & Ansic, 1997; Schubert et al., 1999).

Funk and Strauss (2018) surveyed 2,541 participants (males = 1,278, females = 1263) and found that more men (63%) believe human astronauts are essential for the U.S. Space program compared to women (54%). While men and women groups generally agreed for most subject areas, the two largest differences were priorities, where more men (54%) thought NASA should be conducting basic scientific research compared to only 40% of women. The other largest difference was sending astronauts to Mars, with 25% of men thinking it should be a top priority compared to only 11% of women. The complete list of questions and priorities can be seen in Table 2.

Table 2

Gender Differences in U.S. Space Exploration

Question	% of Men	% of Women
It is essential for U.S. to be a world leader in space exploration	77	66
The space station has been a good investment	84	76
It is essential for NASA to be involved in future space exploration efforts	62	69
It is essential to include astronauts in future U.S. space program	63	54
Priorities		
Monitoring key parts of Earth's climate system	62	64
Monitoring asteroids/objects that could hit the Earth	65	59
Conducting basic scientific research to increase knowledge of space	54	40
Developing technologies that could be adapted for other uses	44	39
Conducting research on how space travel affects human health	41	35
Searching for raw materials/natural resources for use on Earth	34	35
Searching for life and planets that could support life	31	31
Sending astronauts to Mars	25	11
Sending astronauts to the moon	16	10

Note: Created from "Majority of Americans Believe It Is Essential That the U.S. Remain a Global Leader in Space" by C. Funk and M. Strauss, 2018, Pew Research Center (https://www.pewresearch.org/science/2018/06/06/majority-of-americans-believe-it-is-essential-that-the-u-s-remain-a-global-leader-in-space/).

Gender was a significant predictor in several willingness studies (Anania, Rice et al., 2018; Crouse et al., 2021; Entradas et al., 2013; Rice & Winter, 2019; Mehta et al., 2021; Milner et al., 2021; Winter et al., 2018, 2019). The current study will define gender as male or female.

Age. DeMarco and Wright (2021) found that an individual's interest in space tourism decreases with age. The researchers defined generations as individuals who were a certain age at the time of the survey. The groups were Gen Z between 18 – 24, Millennials between 24 – 40, Gen X between 41 – 55, and Baby Boomers between 56 – 75 (63% of Gen Z versus 38% for baby boomers). Funk and Strauss (2018) explored differences in age groups. The researchers grouped participants as follows: Millennials (n = 667) between 1981 and 1996; Gen X (n = 558) between 1965 and 1980; and Baby

Boomers and older generations (*n* = 1,274) from 1964 or earlier. The results found that each generational group expressed nearly equal support for U.S. space endeavors. The few differences were that more Millennials (88%) think the International Space Station is a good investment compared to Gen X (78%) and Baby Boomers (75%). Additionally, the Millennials (66%) feel it is more important to include astronauts in the future U.S. space program compared to Gen X (57%) and Baby Boomers (53%), which could improve the support for Artemis among younger generations.

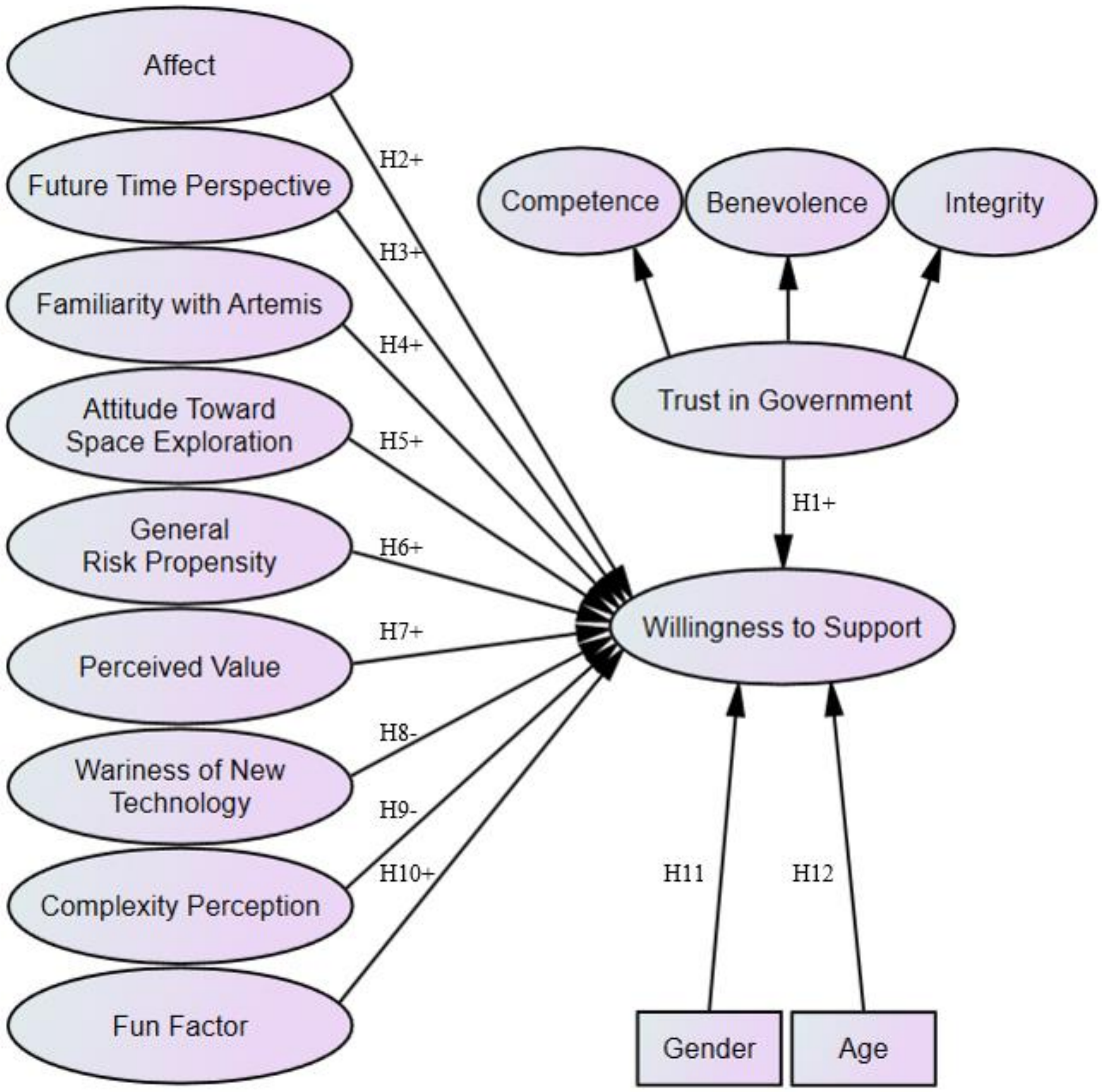
There seems to be a relationship between age and FTP. As stated before, individuals who are aware of their mortality in their later years are more focused on emotional gratifications instead of individual desires (Kessler & Staudinger, 2009). Turning away from their desires could be why age was a common predictor in only a few willingness studies (Rice et al., 2019; Winter et al., 2019), as researchers explored attitudinal data versus behavioral data. Another study by Rice and Winter (2019) found gender to be significant in only one of three studies. The current study used age as a continuous variable.

Justification of Factor Selection and Hypotheses

This section discusses the hypothesized research model and the justification of the hypotheses. The hypothesized research model for the current study can be found in Figure 3, with definitions for each variable in Table 3.

Figure 3

Hypothesized Research Model



Note: The model does not depict observed variables for clarity. A plus sign indicates a positive relationship, whereas a negative sign indicates a negative relationship.

Table 3

Research Variables

Variable	Description
Trust in Government	A scale measuring three dimensions of trust in government: perceived competence, benevolence, and integrity (Grimmelikhuijsen & Knies, 2015).
Affect	A scale to determine emotional response to a scenario (Rice & Winter, 2015).
Future Time Perspective	A scale used to determine people's thoughts, feelings, and actions related to their futures (Carstensen & Lang, 1996).
Familiarity with Artemis	Adapted from Rice et al. (2019) to determine if an individual understands NASA's Artemis mission.
Attitude Towards Space Exploration	Adapted from Entradas et al. (2013) to explore the public's attitudes towards space exploration.
General Risk Propensity	The general risk propensity scale (Zhang et al., 2018) explores if an individual is more inclined to risky behaviors.
Perceived Value	A scale developed by Zeithaml (1988) to explore consumer perceptions of value of an object.
Wariness of New Technology	Developed by Rice et al. (2019) to explore consumer's wariness of new technology.
Complexity Perception	A scale to explore how complex an object is perceived by a consumer (Rice et al., 2019).
Fun Factor	Developed by Rice et al. (2019) to examine how fun an item is to a consumer.
Gender	Will be categorized as Male and Female.
Age	Scored continuously.
Willingness to Support	A modified scale to explore an individual's WTS the Artemis mission (Rice et al., 2020).

The current study used 12 exogenous variables and explored their effect on the endogenous variable, WTS.

Trust in Government. NASA is a U.S. government agency funded through taxpayer contributions. As citizens are one of the primary stakeholders in the agency, NASA must be transparent in all it does. The symbiotic relationship between citizens and NASA contains the two elements relevant to trust: risk and interdependence (Bachmann, 2011; Fisher et al., 2010; Hardin, 1993; Lewicki & Bunker, 1995; Lewicki et al., 1998; Mayer et al., 1995; McAllister, 1995). Therefore, based on the above literature, the following hypothesis is proposed:

H_1: Trust in Government is positively associated with willingness to support Artemis.

Affect. Emotions play a significant role in an individual's decision-making process (Angie et al., 2011; Dickert, 2009; Diener & Emmons, 1984; Isen & Means, 1983; Raghunathan & Pham, 1999; Watson et al., 1988) and was a significant predictor in several willingness studies (Anania, Mehta et al., 2018; Anania, Rice et al., 2015, 2018; Mehta et al., 2021; Milner et al., 2021; Rice & Winter, 2019; Walters et al., 2018; Winter et al., 2015, 2017, 2018, 2019; Winters & Trombly, 2019). Based on the literature above, the following hypothesis is proposed:

H_2: An individual’s affect score is positively associated with a willingness to support Artemis.

Future Time Perspective. Individuals who view their future poorly may be less willing to put effort into supporting a large-scale endeavor. The FTP scale (see Appendix C) developed by Carstensen and Lang (1996) was used for the current study to measure how individuals perceive their future. As individuals age, their FTP average decreases (Coudin & Lima, 2011; Grühn et al., 2016; Lang & Carstensen, 2002; Sharifian, 2017), which could reduce their support for NASA's Artemis mission. Therefore, the following hypothesis is proposed:

H_3: Future Time Perspective is positively associated with a willingness to support Artemis.

Familiarity and Attitudes. Zajonc (2001) found that repeated exposure to something can condition individuals to positively influence those individuals. This positive influence could improve their familiarity with the subject area. Exposure could also change individual attitudes (e.g., Anania, Rice et al., 2018). Additionally, if individuals are more familiar with something, they may view the risk of the system to be minimal. However, viewing something as less risky does not necessarily mean the individuals are less risk inclined. However, it could be assumed that those with a higher risk propensity would support higher-risk products or services. Familiarity was present in several willingness studies (Anania, Rice et al., 2018; Milner et al., 2021; Rice & Winter, 2019; Winter et al., 2018) and will be explored using the familiarity scale developed by Rice et al. (2019). Based on the above literature, the following hypotheses are proposed:

H_4: Familiarity with Artemis is positively associated with a willingness to support Artemis.

H_5: An individual’s attitude towards space exploration is positively associated with a willingness to support Artemis.

H_6: General Risk Propensity is positively associated with a willingness to support Artemis.

Perceived Value. An individual's perceived value can predict actual user behavior (Venkatesh et al., 2003). Value is a common predictor throughout willingness studies (Anania, Mehta et al., 2018; Crouse et al., 2021; Milner et al., 2021; Rice et al., 2019; Rice & Winter, 2019; Winter et al., 2019, 2021). Therefore, the following hypothesis is proposed:

H_7: Perceived value is positively associated with a willingness to support Artemis.

Technological Factors. As stated above, Rice et al. (2019) developed several scales to address issues found with the TAM. The rapid evolution of technology can result in the wariness of new technology as individuals go through their decision-making process (Lee & Moray, 1992; Lee & See, 2004; Merritt & Ilgen, 2008; Muir, 1987; Riley, 1989). If the technology in question is highly complex, individuals may be less willing to use or support it. However, as they use the technology, they could have fun, increasing their likelihood of supporting it.

Wariness of New Technology was a predictor in several willingness studies (Anania, Mehta et al., 2018; Milner et al., 2021; Rice et al., 2019; Rice & Winter, 2019; Winter et al., 2020). Fun factor was a predictor in several willingness studies (Baugh et al., 2018; Milner et al., 2021; Rice et al., 2019; Rice & Winter, 2019; Winter & Trombley, 2019). Complexity Perception was a significant predictor in several willingness studies (Milner et al., 2021; Rice et al., 2019; Rice & Winter, 2019). Therefore, with the above literature, the following hypotheses are proposed:

H_8: Wariness of new technology is negatively associated with a willingness to support Artemis.

H_9: Complexity Perception is negatively associated with a willingness to support Artemis.

H_{10}: Fun factor is positively associated with a willingness to support Artemis.

Demographic Variables. Two primary demographic variables were identified in the literature. Men and women use technology differently. While Artemis is a NASA mission that individuals cannot directly use, they can still use the information and data provided by NASA. Men are more likely to engage in risky behaviors (Byrnes et al., 1999; Powell & Ansic, 1997; Schubert et al., 1999) and, therefore, could be more supportive of Artemis. Gender was a significant predictor in several willingness studies (Anania, Rice et al., 2018; Crouse et al., 2021; Entradas et al., 2013; Rice & Winter, 2019; Mehta et al., 2021; Milner et al., 2021; Winter et al., 2018, 2019). The current study defines gender as male or female.

The second demographic variable identified in the literature was age. Despite this variable only being present in a few willingness studies (Rice et al., 2019; Rice & Winter, 2019; Winter et al., 2019), other surveys found age differences for support among NASA. One of the most significant findings was that interest in space tourism decreases with age. Even though individuals will not be able to travel on NASA's Artemis mission, they can follow along and be there virtually with the astronauts. This may result in the younger generations engaging in more parasocial interactions and having more support for Artemis. Based on the above literature, the following hypotheses are proposed:

H_{11}: Males will be significantly more willing to support Artemis than females.

H_{12}: Younger individuals will be significantly more willing to support Artemis than older individuals.

Summary

There needs to be current research on WTS NASA's Artemis mission. Grounded by Vigoda (2002) and an exhaustive review of willingness studies, the current study aimed to identify public perceptions of NASA's Artemis mission. The study explored willingness to support through the 12 factors identified throughout the literature: trust in government, affect, future time perspective, familiarity with Artemis, attitude towards space exploration, general risk propensity, perceived value, wariness of new technology, complexity perception, fun factor, gender, and age. To date, no studies have identified the type of person willing to support NASA's Artemis mission, and the current study aimed to fill the gap in the literature.

Chapter III: Methodology

Chapter III provides an overview of the current study's research approach, design, and process. Additional sections outline the data collection process, the instrument for the study, and ethical considerations. The chapter concludes with a detailed explanation of the data analysis approach for the current study. The goal of this chapter is to provide details for others to replicate the research and allow for complete transparency with the processes used.

Research Method and Design

The current study used a quantitative method and a non-experimental, cross-sectional design using a survey approach. Quantitative research examines relationships between variables (Byrne, 2016; Kline, 2015) and, in this case, predictors of the public's willingness to support NASA's Artemis mission. Due to the study's exploratory nature and non-experimental design, a survey approach was chosen (Edmonds & Kennedy, 2016) to explore if differences in the group exist on a single independent variable, willingness to support NASA's Artemis mission.

According to Wiggins and Stevens (2016), surveys help explore consumer intentions and make inferences about their intentions. However, the survey collected attitudinal data versus behavioral data. This is not of concern since research has found that attitudes correlate with behavioral intentions (Ajzen, 1991; Ajzen & Fishbein, 1980, 2005). No studies to date have explored this topic; therefore, no current theories support space exploration. The current research is designed to further understand the issue. Consequently, the researcher aimed to explore which factors contribute to the public's WTS NASA's Artemis mission while explaining the largest variance.

Population/Sample

Population and Sampling Frame

As the current study explored public support for NASA's Artemis mission, the target population was individuals in the United States that would likely participate in the democratic process. It would be impossible for the researcher to target the entire U.S. population; therefore, a convenience sample from MTurk was used.

Studies have shown that data obtained from MTurk is comparable to traditional laboratory studies (Buhrmester et al., 2011; Germine et al., 2012). MTurk allows researchers to set qualifying criteria for participants, which helps increase the data quality. The researcher established three specific criteria for participants: (1) a minimum performance rating of 98% from all previous studies, (2) completion of at least 500 prior studies, and (3) be a resident of the United States. The sampling frame, therefore, consists of individuals who can access and complete the survey on MTurk.

Sampling Strategy

The current study used a convenience sample from MTurk. Several studies have explored the population of MTurk compared to the U.S. population. The most comprehensive study was conducted as a longitudinal study over 28 months. Difallah et al. (2018) used a capture-recapture technique to explore the size and dynamics of the population of MTurk. The researchers designed a simple survey to ask six demographic questions to MTurk workers. Participants were able to access the survey once every 30 days. Over the course of their study (859 days), the researchers collected a total of 84,511 responses to their survey and identified 39,461 unique MTurk users.

MTurk Demographics. Difallah et al. (2018) found that 75% of the population is from the U.S., followed by India (16%) and Canada (1.1%). Gender was balanced throughout the study when looking at the whole population, with 51% of workers being female and 49% being male. However, when looking at the U.S. population, females made up 55% of the population. The participants were found to be younger than the general population, with 80% of workers being born after 1970. This differs slightly from the adult U.S. population, where 60% of workers were born after 1970. There were also some discrepancies in income. The median pay for the U.S. MTurk population was around $47K versus the median income of around $67K, as reported in the 2020 Census (Shrider et al., 2021). However, this discrepancy could be explained by the onset of COVID-19 and the Economic Impact Payments sent to U.S. citizens in 2020 (U.S. Department of the Treasury, n.d.).

MTurk Population Size. Difallah et al. (2018) also estimate the number of workers on MTurk using the capture-recapture technique. This technique used the two-occasion model where the capture phase identifies new workers and sets a 30-day timeline to return to the study. The recapture phase looks for the workers to return after the 30 days. The researchers estimate the half-life of the workers at 404 days, which means about half of the population will leave the site after about 400 days. Further, they found that there are estimated to be around 7.3K workers on MTurk for experiments at any given time.

Current MTurk Population. Difallah et al. (2018) are still collecting data and have developed a webpage to detect populations at any timeframe. MTurk Tracker will allow a researcher to pull specific demographic information during the study to compare the population during data collection to the U.S. population. Using this technique ensures the most accurate depiction of the MTurk population at the time of the study.

Sample Size

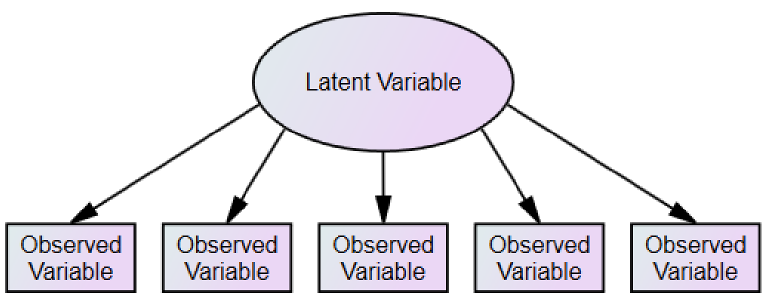
Several researchers have provided different sample size requirements for Structural Equation Modeling (SEM) studies without a consensus. However, Soper (2022) developed an A-priori Sample Size for Structural Equation Models grounded by Cohen (1988) and Westland (2010). Several factors influence the sample size for SEM. The more complex the model, the larger the sample size needed to obtain reliable parameter estimates (Browne & Cudeck, 1992). The same increase can be said for the number of latent constructs (Bentler & Chou, 1987; Kline, 2015) and observed variables (Kline, 2015; MacCallum et al., 1996). Additionally, if the research aims for higher accuracy, it will require a larger sample size (Hair et al., 2018). Westland (2010) conducted a meta-analysis of 74 SEM studies to develop a formula that can provide an estimated sample size based on parameters discovered from the analysis. The Westland (2010) equation was used by Soper (2022) to develop a sample size calculator for SEM studies.

To determine the minimum sample size for the current study, the researcher used the a-priori sample size calculator for SEM (Soper, 2022). The calculator asks the researcher to specify five separate variables for the calculation. The first is the anticipated effect size ($f2$), which describes the magnitude and strength of a study (Fritz et al., 2012). Cohen (1988, 1992) identified three effect sizes of 0.1, 0.3, and 0.5, representing small, medium, and large effects, respectively. The next input is the desired statistical power level (1-β), which is the probability of rejecting a false null hypothesis (Serdar et al., 2021). The selected power level is typically 0.80 (Cohen, 1988; Serdar et al., 2021; Soper, 2022; Suresh & Chandrashekara, 2012). A power level of 0.80 means a 20% chance of committing a Type II error. However, Serda (2021) points out that a reduction in the probability of committing a Type II error can result in an increase in a Type I error, and vice versa. Therefore, researchers must carefully balance the inputs.

The next input is the number of latent variables. Latent variables are the unobserved variables in the study inferred by their observed variables (Fornell & Larcker, 1981). WTS is an example of a latent variable, with the seven questions being the observed variables that influence WTS. The next input is the observed variables. Observed variables form the unobserved variables. This is shown in Figure 4.

Figure 4

Latent Variable and Observed Variables



The final input for Soper's (2022) calculator is the probability level (α), the *p*-value, or the Type I error rate. The probability level is the obtained statistical probability of incorrectly accepting the alternate hypothesis (Serdar et al., 2021). If the researcher rejects a null hypothesis that is true (false-positive), they commit a Type I error. Cohen (1962) discusses the relative seriousness of Type I and Type II errors in statistical hypothesis testing. He argues that Type I errors (false-positive) are generally more severe than Type II errors (false-negative) and that researchers should take more stringent precautions to minimize the risk of Type I errors. It could be reasoned that the established baselines that suggest a Type I error is four times worse than a Type II error. A *p*-value of 0.05 suggests a 5% chance of a Type I error, and a power level of 0.8 suggests a 20% chance of a Type II error.

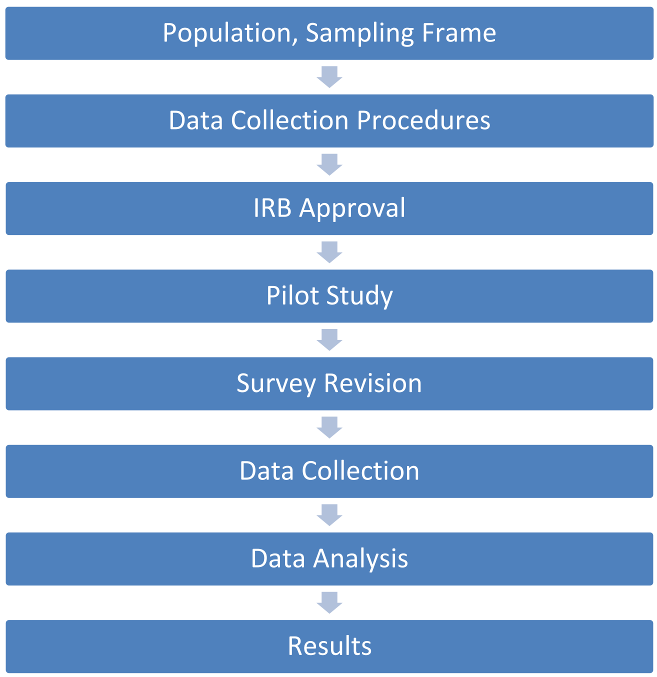
The following parameter values were used for the current study: an anticipated effect size of 0.2, a desired statistical power level of 0.8, a number of latent variables of 11, a number of observed variables of 72, and a statistical significance of $p < .05$. This resulted in a minimum sample size of 488. Due to the two-stage approach, two data sets will be needed, resulting in 976 total participants, rounded to 1000 for convenience. However, to account for participants who may be unresponsive or do not complete the survey, an additional 10% will be added, resulting in a total target sample size of 1,100.

Data Collection Process

The current study used an ordered process to ensure its successful completion. The first step was identifying the population, sampling frame, and sample. Next, the instrument and data collection procedures were established. Once completed, an application was submitted to Embry-Riddle Aeronautical University’s Institutional Review Board (IRB) to obtain permission for data collection. Upon approval, a pilot study was conducted. The pilot study aimed to determine the instrument's feasibility before the actual data collection. The pilot study allowed the researcher to modify and revise the instrument, as necessary. Once the revisions were completed, the entire data collection process was conducted, followed by data analysis. Finally, the results are reported in Chapter IV. The procedure is depicted in Figure 5.

Figure 5

Research Study Process



Design and Procedures

The current study used a non-experimental design. Since the research is exploratory in nature, the non-experimental approach allowed the researcher to explore the variables that may influence support. Therefore, a two-stage approach was conducted using model generation and model validation. A pilot study was conducted to verify and validate the scales used in the current study. The pilot study allowed the researcher to demonstrate construct validity and ensure the instrument is designed correctly. The pilot study took place on MTurk, used the completed instrument, and followed the same process as the primary study.

Apparatus and Materials

The instrument for the study was created using Google Forms ®. It was accessible to participants through the listing on MTurk. The first section of the instrument was an informed consent agreement. All participants were required to agree to the consent and verify that they were at least18 years old and a U.S. resident. They were dismissed from the study if they disagreed with the informed consent. Once they agreed and entered the survey, they were eligible for compensation, even if they failed to complete it. Subjects were compensated $0.75 for their participation in the study.

Once they entered the survey, the participants were given the scales and their descriptions, presented randomly to prevent ordering effects, including the randomization of questions in each scale. After the participants completed the scales, they moved to the next section, which contained the scenario with the WTS scale. Finally, demographic information was collected from the participants. Once participants provided their demographic data, they were directed to the code generation page, where they were debriefed, compensated, and released from the study.

Sources of the Data

The data was collected via an online survey through Google Forms. All items used in the instrument have been validated in previous studies and were slightly modified for the current study. The scales can be found in Table 3 with their descriptions and sources. The complete survey instrument can be found in Appendix C. To improve the quality and validity of the collected data, the current study established criteria in MTurk for participants. These include a minimum performance rating of 98%, completion of at least 500 prior studies, and being a resident of the United States. The purpose of these criteria is to reduce the number of unengaged respondents.

Ethical Consideration

Informed Consent and Voluntary Participation

Informed consent is the process by which a potential research participant is given information about a study and decides whether to participate. The purpose of informed consent is to ensure that participants are fully informed about the nature and purpose of a study and any potential risks and benefits before deciding to participate (Babbie, 2020; Vogt et al., 2012). Participants were presented with the informed consent form at the start of the survey, which can be found in Appendix B. Participants had to agree to the informed consent form to complete the survey. Participation in the study was entirely voluntary. Participants were told that they may discontinue participation at any time and still receive compensation once they entered the study.

Anonymity and Confidentiality

Anonymity and confidentiality are of serious concern to the researcher. Participants' information was collected anonymously through Google Forms ®. No personal information besides basic demographic details pertinent to the current study was collected. The participants' IP addresses were be collected for the study. The researcher kept participant data on a password-protected device to ensure no one other than the researcher could access the records. Any data reported from the study will identify the type of person willing to support NASA's Artemis mission but will not include any identifiable information from the participants.

Institutional Review Board

The purpose of an Institutional Review Board (IRB) for research is to protect the rights and welfare of human research participants. The IRB has the authority to approve, require modifications to, or disapprove research studies and must ensure that the study design, procedures, and informed consent process are all ethical and appropriate. The IRB is also responsible for monitoring ongoing research studies to ensure they comply with ethical standards and regulations (Grady, 2015; Lincoln & Tierney, 2004; Vogt et al., 2012). Before data collection, the researcher obtained approval through Embry-Riddle Aeronautical University's IRB. Additionally, the researcher has a valid and current certificate through the Collaborative Institutional Training Initiative (CITI) on the ethical treatment of human subjects. The IRB approval can be found in Appendix A.

Measurement Instrument

The instrument for the current study is electronic survey data collected using Google Forms ®. Participants were first provided with the informed consent form for the study. If participants disagreed, they were thanked and released from the study. Participants who accepted the informed consent were then presented with general instructions for the survey. On the next page, participants provided their demographic information.

The next section asks questions relating to the individual's behaviors. The items included in this section are FTP, wariness of new technology, attitude toward space exploration, and the general risk propensity scale. Once participants completed the behaviors section, they then moved to the section questioning the individual's views. The items in this section include familiarity with Artemis, PV, Fun Factor, and Trust in Government.

The last section contains the scenario for the study. The scenario was developed using material quoted from NASA's Lunar Exploration Program Overview (NASA, 2020) and NASA's Artemis webpage (NASA, n.d.) to ensure respondents were presented with an accurate representation of the mission. The participants then answered two scales related to the scenario: affect and WTS. Once completed, participants were thanked, compensated, and released from the study. The entire instrument can be found in Appendix B.

Pilot Study

The purpose of a pilot study is to test the measurement models and assess the feasibility of the research design before conducting the main study. A pilot study can help researchers identify potential problems and refine the measurement instruments, the sampling strategy, and the data collection procedures (Malmqvist et al., 2019). The pilot study took place after the IRB approved the study, but before the full data collection. The researcher used the same sampling frame for the pilot study as described in this chapter. The pilot study for the current study used an iterative process until the researcher achieved the desired outcome: a completed instrument free of errors and ambiguity for use in the main study.

An additional inclusion to the pilot study was a feedback section for participants. This additional section aims to allow participants to submit a written comment about the instrument. Participants were asked to identify if they had any confusion with any sections, to identify any ambiguous wording in questions, scenarios, or statements in the instrument, and to provide an estimated completion time. The pilot study results were used to modify the instrument and repeat the process until there was little to no participant feedback.

Using a pilot study to test the method and constructs using user feedback increases the credibility and dependability of the instrument for the study (Pratt & Yezierski, 2018). The results of the pilot study are reported in Chapter IV. As an additional safeguard to ensure the integrity of the data, participants who took part in the pilot study were excluded from the main study through controls implemented in MTurk.

Variables and Scales

Endogenous latent variables are synonymous with dependent variables (Byrne, 2016) and are the variables that are predicted or explained by the other variables in the model. The current study uses one endogenous latent variable, WTS. The WTS scale is a modified version used in the Winter et al. (2019) study. The construct consists of seven questions answered using a 5-point Likert scale ranging from *strongly disagree* (1) to *strongly agree* (5) with a neutral option (3).

An exogenous latent variable is synonymous with an independent variable (Byrne, 2016), and it causes fluctuation in the other constructs in the study. SEM, instead, does not explain the changes in the values of the exogenous variables; researchers consider them to be influenced by other factors external to the model (Byrne, 2016). The current study used ten exogenous latent variables to explore the public's WTS NASA's Artemis mission. The Trust in Government scale (Grimmelikhuijsen & Knies, 2015) consists of nine observed variables answered using a 5-point Likert scale ranging from *strongly disagree* (1) to *strongly agree* (5) with a neutral option (3). The General Affect scale (Rice & Winter, 2015) consists of seven observed variables answered using a 5-point Likert scale ranging from *strongly disagree* (1) to *strongly agree* (5) with a neutral option (3).

The FTP scale (Carstensen & Lang, 1996) has ten observed variables answered using a 7-point Likert scale ranging from *very untrue of me* (1) to *very true of me* (7) with a neutral option (4). The FTP scale uses four reversed scored items, which the researcher must identify during analysis to ensure the scores are applied correctly. The familiarity with Artemis scale (Rice et al., 2019) explores five observed variables answered using a 5-point Likert scale ranging from *strongly disagree* (1) to *strongly agree* (5) with a neutral option (3). The Attitudes Towards Space Exploration scale (Entradas et al., 2013) examines four observed variables answered using a 5-point Likert scale ranging from *strongly disagree* (1) to *strongly agree* (5) with a neutral option (3).

The PV scale (Zeithaml, 1988) asks five questions, which are answered using a 5-point Likert scale ranging from *strongly disagree* (1) to *strongly agree* (5) with a neutral option (3). The general risk propensity scale (Zhang et al., 2018) uses eight observed variables, which are answered using a 5-point Likert scale ranging from s*trongly disagree* (1) to *strongly agree* (5) with a neutral option (3). The final three scales, complexity perception, fun factor, and wariness of new technology, were all developed by Rice et al. (2019). All three explore five observed variables and are all answered using a 5-point Likert scale ranging from *strongly disagree* (1) to *strongly agree* (5) with a neutral option (3).

Finally, background variables were collected for use in the model. The current study used age and gender. Age was collected as a continuous variable. Gender was collected as a categorical variable. The current study only used males and females as the categories for gender to help facilitate the data analysis. Participants who failed to identify their gender were assigned to the gender that is the mode of the data set (i.e., if more females completed the study, unanswered genders were assigned to the female category).

Data Analysis Approach

A two-stage approach was used to facilitate the data analysis approach using SEM. SEM was used to examine factors contributing to an individual's WTS NASA's Artemis mission. The analysis was conducted using IBM ® SPSS Statistics ® version 28 (SPSS) and IBM ® SPSS AMOS Graphics ® version 27 (AMOS). Data was randomly separated into two groups: the calibration and validation groups. While SEM is typically used for confirmatory studies, it was used in an exploratory fashion for the current study. Inherently, SEM has various exploratory features, particularly when researchers respecify the model after the initial analysis.

Use of SEM in Exploratory Research

According to Byrne (2016), the SEM methodology generally takes a confirmatory (i.e., hypothesis-testing) approach based on a structural theory. However, she discusses that many researchers who reject a theoretical model due to poor model fit will continue with the exploratory process of model respecification to reestimate the model. SEM is typically used to specify, estimate, and evaluate models of linear relationships among observed and unobserved variables. According to Roberts et al. (2010), exploratory SEM techniques are beneficial when establishing relationships between constructs. However, this is not the only way SEM can be exploratory; SEM can be used to develop theoretical models.

There are three primary reasons SEM is useful in the development of theories. First, SEM techniques permit the testing of alternative theoretical models (Anderson & Gerbing, 1988). Secondly, during SEM analysis, modification indices can provide the researcher with insight into alternative explanations among the constructs; inspection of the indices can explore alternative models with higher prediction capabilities (Bollen, 1989). Finally, SEM results are replicable and reusable. This allows researchers to advance a theory quickly as SEM can independently confirm results and use them to test new theories among constructs (Frohlich & Dixon, 2006; Hubbard et al., 1988). Therefore, the exploratory technique for the current study was used to establish the structural model, identify factors associated with support for NASA's Artemis mission, and identify the amount of variance explained by each association on WTS (Roberts et al., 2010).

Assumptions

To reach accurate conclusions, SEM requires several underlying assumptions to be satisfied (Byrne, 2016; Kaplan, 2008). The assumptions for SEM include normality, linearity, and independence of errors. One of the most basic assumptions for SEM is that observations are made from a multivariate normal population (Byrne, 2016; Kaplan, 2008; Hair et al., 2018). Skewness measures the asymmetry of a data set, whereas kurtosis is a measure of normal distribution. According to Kline (2015), variables with a skewness greater than three indicate severe skewness. Further, he suggests a conservative rule of thumb where kurtosis values greater than ten violate normality. However, other authors suggest stricter values. Hair et al. (2018) and Byrne (2016) say data is normal if skewness is -2 to +2 and kurtosis between -7 and +7. Therefore, the current study used the stricter thresholds established by Hair et al. (2018) and Byrne (2016). The researcher also created histograms, box plots, and Q-Q plots for the data through SPSS. A visual inspection of these diagrams, along with the skewness and kurtosis, allowed the researcher to verify the assumption of normality for the data set.

The next assumption for SEM involves linearity. As SEM is a type of regression analysis, there is an underlying assumption that the factors have a linear relationship. The researcher used the technique described by Gaskin (2022) in SPSS. The deviation from the linearity test in the ANOVA test was used to verify a linear relationship between the IVs and DV of the model. If the value is < 0.05, the relationship between the IV and the DV is not linear. According to Gaskin (2022), if the test results are in a non-linear relationship, the researcher should then conduct an ordinary least squares linear regression between the IV and DV. The result of this test allows the researcher to meet the assumption of linearity if the value is < .05.

Another assumption for SEM is that a variable residual (error) is consistent across different levels of the variable, a term called homoscedasticity. A visual inspection of a scatter plot with the variable on the y-axis and the variables residual on the x-axis was conducted. The researcher looked for a consistent pattern to verify homoscedasticity. If the pattern is inconsistent, the relationship is considered heteroskedastic, and the researcher can transform the data or separate it into subgroups to ensure the assumption is made before analysis (Gaskin, 2021).

Data Preparation

Data was collected via Google Forms ®. Once the data collection process has been completed, the researcher downloaded the data into Microsoft Excel ® for data analysis. To facilitate analysis, the researcher conducted a case screening of participant data. Cases were screened for missing data, unengaged responses, and outliers. The case screening included identifying missing data in rows, looking for unengaged respondents, and identifying outliers. Missing data was handled using known replacement value. Respondents who failed to answer more than two items from any category were removed from the analysis. To screen for unengaged responses, the researcher evaluated the standard deviations of the scales; for responses that showed little to no deviation, the researcher further investigated those participants to determine if they should be removed from the analysis. Finally, the researcher explored continuous variables for outliers. After individual cases were screened, the researcher moved to variable screening.

Following the case screening, the variable screening took place to identify missing data and examine the skewness and kurtosis of the data. Missing data was handled by using the mean value of the respondent to impute the missing values (Byrne, 2016; Cohen et al., 2014). If respondents failed to answer more than two items from any category, they were removed instead of having the data imputed. Once the data had been properly prepared, the data was randomly separated into two even datasets, the calibration and the validation groups, to facilitate the two-stage process.

Stage 1 – Development of Structural Model

Stage 1 used the calibration group to identify the variables that are statistically significant predictors of WTS Artemis. A Confirmatory Factor Analysis (CFA) was conducted to assess the model, followed by the full structural model.

Confirmatory Factor Analysis. Once data has been fully prepared, the CFA will assess the measurement model with each construct. The goal of the CFA was to establish the extent to which the observed variables are associated with their latent factors (Byrne, 2016). Cutoff criteria established by Hu and Bentler (1999) were used to determine model fit, as shown in Table 4.

Table 4

Cutoff Criteria for Model Fit

Measure	Unacceptable	Acceptable	Excellent
CMIN/DF	> 5	> 3	> 1
CFI	<0.90	<0.95	>0.95
SRMR	>0.10	>0.08	<0.08
RMSEA	>0.08	>0.06	<0.06
PClose	<0.01	<0.05	>0.05

Note: Adapted from "Cutoff Criteria for Fit Indexes in Covariance Structure Analysis: Conventional Criteria Versus New Alternatives" by L. Hu and P.M. Bentler, 1999, *Structural Equation Modeling: A Multidisciplinary Journal*, *6*(1), 1–55 (https://doi.org/10.1080/10705519909540118).

If one or more criteria are not met in the initial CFA, an iterative process takes place using modification indices to improve the model fit. Once an acceptable model fit is established, additional tests may be conducted to complete the CFA. The researcher screened for convergent and discriminate validity, as Hair (2009) and Fornell and Larcker (1981) describe. Finally, the researcher ensured the square root of the Average Variance Extracted (AVE) was greater than inter-construct correlations as described by Hu and Bentler (1999) to ensure model validity. Once a good model fit was established, the final assessment of the entire structural model was conducted.

Full Structural Model. AMOS was used to conduct the assessment of the structural model. Model fit was assessed using the same cutoff criteria established by Hu and Bentler (1999). Following an acceptable model fit, model fit indices and a summary of the hypothesis testing were reported.

Stage 2 – Validation of Structural Model

The second group (validation group) was used for the model-testing process through a multi-group analysis to examine if invariance exists between the two groups. According to Byrne (2016), two methods exist to test for multigroup invariance through two goodness-of-fit statistics, the χ^2 and the comparative fit index (CFI) value. These two values can be examined to determine which of the tested constructs operates equally between the two groups, as Byrne (2016) described. However, Byrne (2016) suggests that the researchers should select the approach most appropriate for the study. Therefore, for the current study, the researcher used the CFI value.

To accomplish this, the researcher explore the ΔCFI results. Exploring the ΔCFI allowed the researcher to decide on the equivalency of the hypothesized model (from Stage 1) to identify if invariance exists between the two groups (Cheung & Rensvold, 2002). If the ΔCFI values are < 0.01 (Cheung & Rensvold, 2002), one can conclude that all loadings, paths, covariances, residual variances, and measurement variances are equal among the two groups.

The two data files were loaded into AMOS as the calibration group and the validation group for the analysis. The researcher used the AMOS Multiple Group Analysis tool to conduct the analysis. The researcher tested models with different levels of restrictions to see how the model performed over five different models. The inclusion of the structural residuals (i.e., error of the DV) and measurement residuals (error variance from observed variables) will help further restrict each model.

Five models were established for the multigroup analysis. Each model gradually added constraints to make each model more restrictive than the previous model. The first model only tested measurement weights. The second model included structural weights. The third model included structural covariances. The next addition for the fourth model added structural residuals. The final model is the most restrictive with the addition of measurement residuals. A baseline comparison of the five models was examined, with the CFI value being of concern for the researcher.

When the results showed evidence of noninvariance, the researcher used an iterative process to identify the paths contributing to the error. A new final model was established with the items removed. The same process was used as described above to explore the multigroup analysis with the new final model against the validation group. This iterative process continued until the ΔCFI values were < 0.01, showing evidence of multigroup equivalency. This technique will reveal if the Stage 1 model has predictive capabilities by establishing that the calibration and validation groups are equal.

Reliability Assessment Method

Instrument reliability is a primary concern for survey approach research (Rosli et al., 2021). Reliability measures the ability to obtain similar values consistently (Creswell, 2014; Wilson & Joye, 2016). Two methods were used to ensure reliability: Cronbach’s alpha and composite reliability (CR). Cronbach’s alpha measures the degree to which different items in a scale or questionnaire measure the same underlying construct. The researcher used IBM SPSS ® to calculate each scale's values. Values greater than or equal to 0.7 are considered acceptable (Hair et al., 2018; Kline, 2015; Wilson & Joye, 2016).

When true reliability is estimated using structural equation modeling, the resulting estimate is typically referred to as composite reliability (CR). The researcher obtained the CR values during the CFA process using SPSS AMOS ®. Like Cronbach's alpha values, a CR value greater than or equal to 0.7 is considered acceptable (Byrne, 2016; Hair et al., 2018). Both tests described in this section differ statistically; however, they both provide the same function of measuring reliability.

Validity Assessment Method

Construct validity provides validation of a construct and validation of the measurement instrument (Byrne, 2016). The current study examined convergent and discriminant validity. Convergent validity can be defined as "the extent to which different assessment methods concur in their measurement of the same trait" (Byrne, 2016, p.311). Convergent validity was measured by Average Variance Extract (AVE). The researcher ensured AVE and factor loadings were greater than 0.5 (Fornell & Larcker, 1981; Hair et al., 2018; Hu & Bentler, 1999). An iterative process was used during the CFA to improve the convergent validity of the AVE values, which were not satisfactory (Byrne, 2016).

Discriminant validity can be defined as "the extent to which independent assessment methods diverge in their measurement of different traits" (Byrne, 2016, p. 312). To measure discriminant validity, the researcher examined the maximum shared variance (MSV) of each construct. If the MSV of each construct is less than their AVE values, then discriminant validity exists. Next, the researcher examined the square root of AVE to ensure it was greater than inter-construct correlations (Hair et al., 2018). The final assessment for discriminant validity is to ensure the construct correlations are less than .7 (Hair et al., 2018). The MSV was calculated using the Gaskin et al. (2019) Master Validity Tool for AMOS, which uses thresholds established by Hu and Bentler (1999).

Data Analysis Process/Hypothesis Testing

After the researcher has achieved a successful model fit and reliability and validity requirements are met, the final model diagram can be developed (Byrne, 2016; Hair et al., 2018). AMOS was used to conduct the assessment of the full structural model. The researcher used the completed CFA to develop the model. Like the CFA procedure, an iterative process was used to assess model fit. Model fit was assessed using the same cutoff criteria established by Hu and Bentler (1999).

Once the researcher has accepted the final structural model, the values are summarized, and the hypotheses can be examined. Generally speaking, unstandardized coefficients are estimates based on the analysis of raw data, whereas standardized coefficients are estimates based on standardized data (i.e., variables have variance) (Kwan & Chan, 2011). The researcher validated the hypotheses in the structural model through the regression weights. The unstandardized regression weights were used for hypotheses testing criteria to accept a hypothesis, including a Critical ratio (C.R.) and *p*-value. A C.R. value greater than 1.96 indicates two-sided significance at the .05 level and would signify to the researcher that they could accept the hypothesis (Hair et al., 2018). The hypothesis will be confirmed if the p-value returned on a hypothesized path is less than 0.05 and C.R. is greater than 1.96. A statistically significant *p*-value in the opposite direction of the hypothesis will result in a non-supported hypothesis (i.e., a positive statistically significant effect was identified on a negative hypothesis).

The Squared Multiple Correlations (SMCs) were examined. The SMC is an independent measure of all units of measurement. AMOS provides SMC values for each endogenous variable in the model. According to Byrne (2016), "the SMC value represents the proportion of variance that is explained by the predictors of the variable in question" (pp. 212–214). Therefore, the SMC was used to report the amount of variance explained in WTS by the model.

The SEM process allowed the researcher to answer the research questions central to the study. The final model structure answered the first research question: what factors influence an individual’s support of NASA’s Artemis mission? The researcher reports the significance, direction, and strength of each relationship explored in the study in Chapter IV. The two-stage method was used to answer the second research question: does the calibration and validation data set provide model replication? If the researcher finds the ΔCFI between the calibration and validation data set to be < 0.01 (Cheung & Rensvold, 2002), the researcher can conclude that they do provide model replication.

Summary

Chapter III discussed the methodology central to the study. The study used a quantitative method and a non-experimental, cross-sectional design using a survey approach. The researcher used a convenience sample of 1,100 participants from MTurk to facilitate the analysis. A pilot study was conducted to ensure the instrument is clear, concise, and free of errors or ambiguity. The following chapters will detail the results of the study as well as the discussion, conclusions, and recommendations.

Chapter IV: Results

The current study aimed to explore factors that influence support for NASA's Artemis mission. The pilot study will first be discussed, followed by the main study. Chapter IV will also include descriptive statistics and demographic information of the study participants. Next, the full structural model and the hypothesis testing results are presented. Finally, the chapter concludes with the model validation results.

Pilot Study

A pilot study was conducted prior to the main study. The pilot study's purpose was to test the measurement models and assess the feasibility of the research design. Data was screened for missing data, unengaged responses, and outliers.

Pilot Study Results

A convenience sample of 105 participants (73 male) was recruited from MTurk for the pilot study. The data was collected via Google Forms ® and was then downloaded into a Microsoft Excel ® spreadsheet for initial data screening. One participant failed to identify gender, so gender was imputed as the mode value (male). Two participants were missing their age, so the median age was used to replace these values.

SPSS was used to explore for outliers via boxplots, which did not identify any extreme outliers. Known replacement value was used to impute missing data for latent constructs (Hair et al., 2018). Three participants were removed from the data set due to unengaged responses, in which they provided the same Likert answer for every question throughout the survey. Skewness and kurtosis were assessed to explore the normality of the data. The maximum skewness value of -1.17 and kurtosis 1.51 were both below the Hair et al. (2018) and Byrne (2016) thresholds. The initial data cleaning resulted in 102 valid participants for the pilot study. The demographic information can be found in Table 5.

Table 5

Summary of Basic Demographic Characteristics – Pilot Study

Characteristics	Subcategories	Frequency (*n*)	Percentage (%)
Gender	Male	72	70.6
	Female	30	29.4
Ethnicity	Caucasian	94	92.2
	African descent	2	1.9
	Hispanic descent	1	1.0
	Asian descent	-	-
	American Indian or Alaska Native	5	4.9
	Native Hawaiian or Pacific Islander	-	-
	Other	-	-
Education	Less than High School	20	19.7
	High School Diploma/GED	2	1.9
	Some College but no Degree	4	3.9
	Bachelor's Degree or equivalent	64	62.7
	Graduate or other Advanced Degree	7	6.9
	No Response	5	4.9
Employment	Employed	95	93.1
	Not Employed	1	1.0
	Retired	5	4.9
	No Response	1	1.0

The cleaned data was then loaded into SPSS AMOS 27 to conduct a CFA. The cutoff criteria for model fit (Table 4) were used to assess model fit. The initial model fit for the data was surprisingly strong, given the low sample size (n = 102). A review of modification indices failed to identify any strong correlations. Despite not meeting all goodness of fit criteria, the values are considered acceptable for the pilot study due to the low sample size. The results of the pilot study's CFA can be found in Table 6.

Table 6

Goodness of Fit Indices – Pilot Study

Measure	Ideal Value	Initial Value	Interpretation
CMIN/DF	> 1	1.629	Excellent
CFI	>0.95	0.746	Unacceptable
SRMR	<0.08	0.081	Acceptable
RMSEA	<0.06	0.079	Acceptable
PClose	>0.05	0.000	Not Estimated

Note: Thresholds from "Cutoff Criteria for Fit Indexes in Covariance Structure Analysis: Conventional Criteria Versus New Alternatives by L. Hu and P.M. Bentler, 1999, *Structural Equation Modeling: A Multidisciplinary Journal*, *6*(1), 1–55. (https://doi.org/10.1080/10705519909540118).

After establishing an acceptable model fit for the pilot study, the model was assessed for its construct validity. The Master Validity Tool for AMOS (Gaskin et al., 2019) was used to determine the CR, AVE, and MSV Values. SPSS was used to determine Cronbach's alpha values. It should be noted that FTP Cronbach's alpha value was low (0.508). The FTP scale has been used in prior studies with similar results due to the reverse scoring mechanism in the scale (Winter et al., 2020); therefore, the researcher explored this construct further in the main study. FTP's three negative loading factors are all associated with the reverse-scored items. The reliability and validity results can be found in Table 7.

Table 7

Reliability and Validity – Pilot Study

Factor	Item	Factor Loading	AVE	MSV	Cronbach's Alpha	CR
Trust in Government	TC1	0.699	1.138[a]	1.038[a]	0.784	1.042[a]
	TC2	0.803				
	TC3	0.760				
	TB1	0.750			0.747	
	TB2	0.721				
	TB3	0.780				
	TI1	0.732			0.750	
	TI2	0.751				
	TI3	0.768				
Future Time Perspective	FTP1	0.726	0.460	0.722	0.508	0.628
	FTP2	0.713				
	FTP3	0.781				
	FTP4	0.524				
	FTP5	0.713				
	FTP6	0.576				
	FTP7	0.826				
	FTP8	-0.661				
	FTP9	-0.616				
	FTP10	-0.591				
Wariness of New Technology	WNT1	0.522	0.540	0.764	0.848	0.853
	WNT2	0.854				
	WNT3	0.713				
	WNT4	0.805				
	WNT5	0.732				
Attitude Towards Space Exploration	ATSE1	0.705	0.387	0.813	0.710	0.716
	ATSE2	0.672				
	ATSE3	0.577				
	ATSE4	0.536				
General Risk Propensity	GRP1	0.753	0.510	0.666	0.893	0.892
	GRP2	0.779				
	GRP3	0.775				
	GRP4	0.734				
	GRP5	0.707				
	GRP6	0.692				
	GRP7	0.606				
	GRP8	0.662				
Familiarity	FAM1	0.735	0.519	1.008	0.845	0.843
	FAM2	0.692				
	FAM3	0.720				
	FAM4	0.727				
	FAM5	0.738				
Perceived Value	PV1	0.675	0.515	1.206	0.842	0.841
	PV2	0.705				
	PV3	0.766				
	PV4	0.742				
	PV5	0.711				
Fun Factor	FF1	0.787	0.488	1.206	0.822	0.825
	FF2	0.624				
	FF3	0.642				
	FF4	0.758				
	FF5	0.667				
Complexity Perception	CP1	0.714	0.555	0.813	0.858	0.861
	CP2	0.743				
	CP3	0.831				
	CP4	0.806				
	CP5	0.605				
Affect	AFF1	0.679	0.491	1.114	0.871	0.871
	AFF2	0.702				
	AFF3	0.709				
	AFF4	0.693				
	AFF5	0.689				
	AFF6	0.741				

Factor	Item	Factor Loading	AVE	MSV	Cronbach's Alpha	CR
	AFF7	0.701				
Willingness to Support	WTS1	0.737	0.531	1.084	0.885	0.888
	WTS2	0.813				
	WTS3	0.658				
	WTS4	0.790				
	WTS5	0.698				
	WTS6	0.671				
	WTS7	0.717				

Note: [a] indicates a Heywood case.

Convergent validity is established for the model as all factor loadings are greater than 0.5 (Hair et al., 2018). The model failed to present discriminate validity as the MSV values were greater than the AVE value of every construct except for TIG. Additionally, the inter-construct correlations are not all less than the square root of the AVE value, further showing a lack of discriminant validity. However, TIG's AVE, MSV, and CR values are all greater than one, presenting a Heywood case (Heywood, 1931). Farooq (2022) describes a Heywood case as a solution that is otherwise satisfactory but has a communality greater than one. Heywood cases can be due to inadequate sample size, so the researcher will review this phenomenon in the full study with a larger sample size (Farooq, 2022). The full discriminate validity analysis can be seen in Table 8.

Table 8

Discriminate Validity – Pilot Study

	FTP	WNT	ATSE	GRP	FAM	PV	FF	CP	TIG	AFF
FTP	**0.679**									
WNT	0.682	**0.735**								
ATSE	0.850	0.874	**0.622**							
GRP	0.816	0.705	0.749	**0.714**						
FAM	0.731	0.533	0.673	0.761	**0.721**					
PV	0.804	0.399	0.754	0.815	1.004	**0.718**				
FF	0.786	0.423	0.768	0.790	0.949	1.098	**0.698**			
CP	0.598	0.792	0.901	0.644	0.511	0.659	0.703	**0.745**		
TIG	0.779	0.360	0.685	0.716	0.869	1.019	0.998	0.587	**1.067**	
AFF	0.725	0.343	0.675	0.768	0.982	1.056	0.993	0.569	0.976	**0.700**

Note: Bolded values are the square root of the AVE value.

All but one construct revealed high reliability through their Cronbach's alpha and CR values, suggesting the items are internally consistency. The author notes that there did seem to be an issue with discriminate validity; however, with the small sample size and exploratory nature, it could not be diagnosed at that stage. The author developed a plan to reassess the discriminate validity with the full data model and moved forward with the full study.

Main Study

A convenience sample of 1,110 participants was collected from MTurk for the main study. Participants from the pilot study were excluded from participating in the main study. A copy of the instrument can be found in Appendix B. The data collection started October 12, 2023, at 8:23 AM EDT and was completed the same day at 11:03 AM EDT.

Data Preparation

The data was collected via Google Forms ® and was then downloaded into a Microsoft Excel ® spreadsheet for data screening. Data was first randomly assigned to two groups, the calibration and validation data sets. A new column was created with the variable =RAND(). The variable returns a random value between 0 and 1, evenly distributed. The list was then sorted from largest to smallest. The first 555 participants became the calibration data set, and the remaining became the validation data set. All data was screened at the same time for Stage 1 and Stage 2.

Calibration Data Set. Five hundred and fifty-five participants were screened for the calibration data set. No extreme outliers were identified via boxplots in SPSS. Known replacement value was used to impute missing data for latent constructs (Hair et al., 2018). However, three participants were removed due to missing responses for entire scales. One participant failed to identify their gender, which was imputed with the mode of the data set (male). Eight participants failed to identify their ages, imputed with the median age.

Two participants were removed from the data set due to unengaged responses, where they provided the same Likert answer for every question throughout the survey. Skewness and kurtosis were assessed to explore the normality of the data. The researcher observed normal distribution for indicators of the latent factors for skewness and kurtosis. The maximum skewness value of -0.956 (AFF3) and kurtosis -0.714 (WNT2), are both well below the Hair et al. (2018) and Byrne (2016) thresholds. The initial data cleaning resulted in 550 valid participants (354 male) with an average age of 35.05 (*SD* = 7.83) years for the calibration data set. Missing and erroneously reported income data were imputed with the median income ($50,000), resulting in an average income of $53,593 (*SD* = $34,006.53). The demographic information for the Calibration Data set can be found in Table 9.

Table 9

Summary of Basic Demographic Characteristics – Calibration Data Set

Characteristics	Subcategories	Frequency (*n*)	Percentage (%)
Gender	Male	354	64
	Female	196	36
Ethnicity	Caucasian	489	88
	African descent	11	2
	Hispanic descent	24	4
	Asian descent	10	2
	American Indian or Alaska Native	7	1
	Native Hawaiian or Pacific Islander	5	1
	Other	4	1
Education	Less than High School	6	1
	High School Diploma/GED	82	14
	Some College but no Degree	24	4
	Bachelor's Degree or equivalent	377	69
	Graduate or other Advanced Degree	58	11
	No Response	3	1
Employment	Employed	538	98
	Not Employed	8	1
	Retired	4	1

The demographics of the current study were compared to the Hartig et al. (2022) survey that explored voting trends in the midterm election. This comparison will allow the population to be compared to the U.S. population taking place in the democratic process. The percentage of males to females in the current study is not indicative of the population who voted in the 2022 midterm elections, which had 50% male and 49% female turnout. Hartig et al. (2022) reported that white voters represented 75% of voters, 9% black, 9% Hispanic, 3% Asian, and 4% other. The calibration data set has a higher overall percentage of Caucasians and is less diverse than those who voted in the 2022 midterm elections. For education, the 2022 voters reported 43% as college graduates, and 56% less than a bachelor's degree. In contrast, the represented population seems to be more educated, with almost 80% having self-reported a bachelor's degree or higher. Hartig et al. (2022) did not ask individuals about employment. Therefore, for employment, the U.S. Census Bureau (2020) reported an unemployment rate of 4.3%, which is larger than the reported data from the calibration data set. Overall, the calibration data set's demographics do not indicate the population that is likely to participate in the democratic process.

Validation Data Set. Five hundred and fifty-five participants were screened for the validation data set. SPSS was used to explore for outliers via boxplots, of which none were identified. Known replacement value was used to impute missing data for latent constructs (Hair et al., 2018). However, nine participants were removed due to missing responses for entire scales. One participant failed to identify their gender, which was imputed with the mode of the data set (male). Seven participants failed to identify their ages, which was imputed with the median age. Two participants were deemed duplicate entries and removed from the data set.

Three participants were removed from the data set due to unengaged responses, where they provided the same Likert answer for every question throughout the survey. Skewness and kurtosis were assessed to explore the normality of the data. The researcher observed normal distribution for indicators of the latent factors for skewness and kurtosis. The maximum skewness value of -1.001 (FTP6) and kurtosis 0.723 (AFF7) were both well below the Hair et al. (2018) and Byrne (2016) thresholds. The initial data cleaning resulted in 542 valid participants (365 male) with an average age of 34.05 (*SD* = 8.79) years for the validation data set. Missing and erroneously reported income data were imputed with the median income ($50,000), resulting in an average income of $50,804 (*SD* = $37,442.30). The demographic information for the Validation Data set can be found in Table 10.

Table 10

Summary of Basic Demographic Characteristics – Validation Data Set

Characteristics	Subcategories	Frequency (*n*)	Percentage (%)
Gender	Male	366	67
	Female	177	33
Ethnicity	Caucasian	497	91
	African descent	7	1
	Hispanic descent	19	3
	Asian descent	9	2
	American Indian or Alaska Native	6	1
	Native Hawaiian or Pacific Islander	4	1
	Other	1	<1
Education	Less than High School	3	1
	High School Diploma/GED	90	16
	Some College but no Degree	18	3
	Bachelor's Degree or equivalent	359	66
	Graduate or other Advanced Degree	63	12
	No Response	10	2
Employment	Employed	535	97
	Not Employed	12	2
	Retired	4	1
	No Response	2	<1

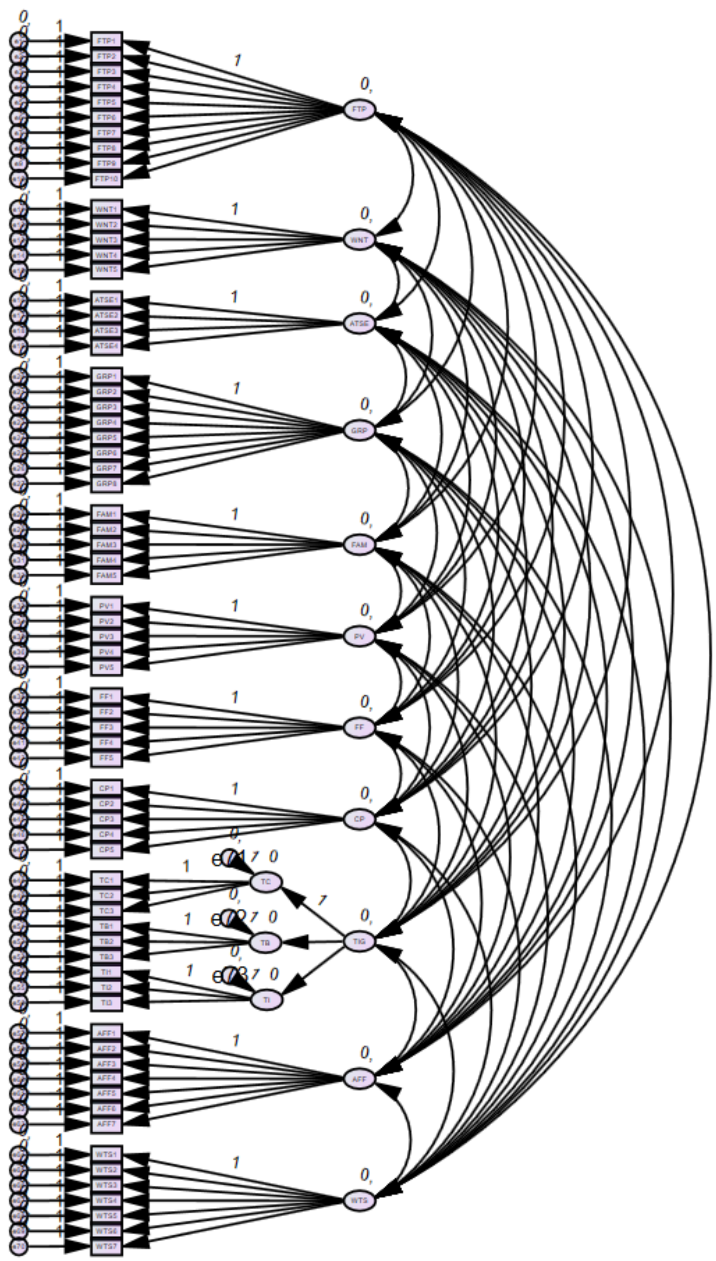
The Hartig et al. (2022) demographic information data was reported in the calibration demographic section. Like the calibration data, the demographic information for the validation data shows more males and Caucasian representation with higher education (82% self-reported bachelor’s or higher) than those members of the population likely to participate in the democratic process.

Stage 1 – Calibration Data Set Confirmatory Factor Analysis

The CFA was conducted using AMOS 27. The initial CFA model can be found in Figure 6.

Figure 6

Initial Calibration Data Set CFA Model



The CFA was conducted to gain a cursory model fit. The model fit measures were all excellent, except for CFI, which was acceptable. While the initial goodness of fit indices showed model fit, several issues were identified in the model that need to be addressed before the final CFA model can be accepted. The first area of concern involved the FTP scale. As stated earlier, FTP8, FTP9, and FTP10 are reversed-scored items. The model had a negative standardized estimate value for the three reverse-scored items, indicating that respondents did not answer the question as intended. Therefore, FTP8, FTP9, and FTP10 were removed. After removing the three items, the model fit improved, as shown in Table 11.

Table 11

Goodness of Fit Indices – CFA Calibration Data Set

Measure	Ideal Value	Initial Value	Modified Value	Interpretation
CMIN/DF	3 > 1	1.573	1.516	Excellent
CFI	>0.95	0.945	0.953	Excellent
SRMR	<0.08	0.042	0.041	Excellent
RMSEA	<0.06	0.032	0.031	Excellent
PClose	>0.05	1.000	1.000	Excellent

Note: Thresholds from "Cutoff Criteria for Fit Indexes in Covariance Structure Analysis: Conventional Criteria Versus New Alternatives" by L. Hu and P.M. Bentler, 1999, *Structural Equation Modeling: A Multidisciplinary Journal*, *6*(1), 1–55 (https://doi.org/10.1080/10705519909540118).

Reliability and Validity Testing. Once cursory model fit was established, the model was assessed for reliability and validity. The Master Validity Tool for AMOS (Gaskin et al., 2019) was used to determine the CR, AVE, and MSV Values. SPSS was used to determine Cronbach's alpha values. As identified in the pilot study, there was a concern with the discriminant validity of the model. Therefore, an iterative process was used under the theoretical perspective of SEM to improve validity issues. The Heywood case with TIG replicated in the main study and required additional analysis (Farooq, 2022; Harman & Fukuda, 1966). The initial discriminant validity values can be seen in Table 12.

Table 12

Discriminate Validity – Initial Calibration Data Set

	CR	AVE	FTP	WNT	ATSE	GRP	FAM	PV	FF	CP	TIG	AFF
FTP	0.918	0.617	**0.786**									
WNT	0.870	0.573	0.630	**0.757**								
ATSE	0.703	0.372	0.877[b]	0.866[b]	**0.610**							
GRP	0.898	0.525	0.857[b]	0.697	0.899[b]	**0.725**						
FAM	0.828	0.491	0.791[b]	0.601	0.853[b]	0.816[b]	**0.701**					
PV	0.826	0.487	0.833[b]	0.532	0.920[b]	0.834[b]	0.983[b]	**0.698**				
FF	0.822	0.480	0.860[b]	0.545	0.922[b]	0.845[b]	0.967[b]	1.086[a,b]	**0.693**			
CP	0.855	0.541	0.675	0.768[b]	0.895[b]	0.704	0.549	0.677	0.681	**0.736**		
TIG	1.037[a]	1.121[a]	0.789[b]	0.530	0.830[b]	0.743[b]	0.889[b]	0.944[b]	0.931[b]	0.626	**1.059[a]**	
AFF	0.864	0.477	0.797[b]	0.409	0.825[b]	0.690	0.867[b]	0.927[b]	0.940[b]	0.541	0.849	**0.690**

Note: Bolded values are the square root of the AVE value. [a] indicates a Heywood case. [b] indicates an inter-construct correlation greater than the AVE value.

The initial analysis revealed several inter-construct correlations higher than the square root of the AVE Value, which demonstrates a lack of discriminant validity according to Fornell and Larcker (1981). Henseler et al. (2015) developed a more acceptable measure of discriminate validity by taking the average of correlations for observed variables within the same construct. This technique is known as a heterotrait-monotrait ratio of correlation (HTMT) analysis, which was used to determine discriminate validity for the current model. To demonstrate discriminate validity, the cutoff values are considered acceptable when below 0.90 (Hair et al., 2018; Hensler et al., 2015; Kline, 2015; Rönkkö & Cho, 2022). The HTMT results can be seen in Table 13.

Table 13

HTMT Analysis – Initial Calibration Data Set

	FTP	WNT	ATSE	GRP	FAM	PV	FF	CP	TIG	AFF	WTS
FTP	-										
WNT	0.659	-									
ATSE	0.881	0.890	-								
GRP	0.859	0.707	**0.900**	-							
FAM	0.790	0.623	0.848	0.815	-						
PV	0.830	0.551	**0.913**	0.831	**0.982**	-					
FF	0.860	0.567	**0.921**	0.843	**0.965**	1.**086**	-				
CP	0.684	0.769	**0.907**	0.707	0.550	0.679	0.689	-			
TIG	0.798	0.556	0.841	0.752	0.899	**0.957**	**0.947**	0.641	-		
AFF	0.792	0.420	0.818	0.686	0.865	**0.928**	**0.939**	0.540	0.860	-	
WTS	0.813	0.464	0.826	0.724	0.832	**0.962**	**0.978**	0.642	**0.904**	**1.008**	-

Note: Bolded items are unacceptable (> 0.9).

An iterative process was used to perform the HTMT analysis, with an understanding that the theory central to the current study would inform the decisions. Upon initial assessment, the construct for Attitude Towards Space Exploration (ATSE) AVE value was 0.372, below the recommended value of 0.500 (Hair et al., 2018). Due to the low AVE of ATSE and its high correlation with four other factors, the ATSE construct was removed from the model. The next group of high correlations involves FAM, PV, and FF. FAM is highly correlated with PV and FF, PV is highly correlated with FF, TIG, AFF, and WTS, and finally, FF is highly correlated with TIG, AFF, and WTS. When examining these variables, there are some similarities in the questions being asked, which could explain the high correlations, as each discusses value, interest, and knowledge. When examining the observed variables individually, the researcher determined that since all three variables are similar, only one was kept for the full model. The model was assessed three separate times with only FAM, PV, or FF loaded. The statistical results indicate that leaving FAM over PV and FF corrected the discriminate validity issues with these constructs. From a theoretical standpoint, Vigoda (2002) expanded on the democratic theory (Pateman, 1970) that suggests people should be involved in governing themselves. When further examining the constructs used, FAM, PV, and FF are like the public-sector performance construct, which explores satisfaction with services and operations. FAM has been shown to influence support when the company is the driving force of information (Sabherwal et al., 2021), which is what NASA is doing with its outreach for Artemis. With statistical and theoretical justification, FAM was used for the current study, and PV and FF were removed from the model. The model's discriminate validity has improved, but additional concerns remain.

The next discriminate validity concern involves TIG and AFF being highly correlated to WTS. TIG and AFF are highly correlated at 0.860 but met the 0.9 threshold. When exploring the questions asked for these constructs, there is overlap in TIG and AFF, with both exploring attitudinally emotional-based responses (sincere, honest, positive, favorable, etc.). This is also replicated in the WTS questions asking about support with emotional responses (happy, safe, confident, etc.). From a theoretical standpoint, TIG and AFF are similar to FCI, which involves an individual's attitude towards democracy and how much a citizen can affect change in the system. Affect was one of the most significant influencers in willingness studies (Anania, Rice et al, 2018; Angie et al., 2011; Bergstrom & McCaul, 2004; Crouse et al., 2021; Dickert, 2009; Diener & Emmons, 1984; Hohenberger et al., 2016; Isen & Means, 1983; Lamb et al., 2021; Mehta et al., 2021; Rains et al., 2017; Ragbir et al., 2021; Raghunathan & Pham, 1999; Watson et al., 1988; Winter et al., 2017; Rice & Winter, 2015b, 2019; Winter et al., 2015, 2017).

The researcher used the iterative process to explore three additional models to improve discriminate validity: (1) removed only AFF, (2) removed only TIG, and (3) removed both AFF and TIG. Despite AFF being a strong predictor in several studies, it cannot be used here due to the discriminate validity concerns on the dependent variable, WTS. The removal of both AFF and TIG resolved the discriminant validity concerns, with all values falling under the 0.9 threshold (Hair et al., 2018; Hensler et al., 2015; Kline, 2015; Rönkkö & Cho, 2022). Additionally, as suggested by Farooq (2022), removing the troublesome indicator is an appropriate method to resolve the Heywood case, which provided additional support for the removal of TIG. The final HTMT results can be seen in Table 14.

Table 14

HTMT Analysis – Final Calibration Data Set

	FTP	WNT	GRP	FAM	CP	WTS
FTP	-					
WNT	0.659					
GRP	0.859	0.707	-			
FAM	0.790	0.623	0.815	-		
CP	0.684	0.769	0.707	0.550	-	
WTS	0.813	0.464	0.724	0.832	0.642	-

Convergent validity was assessed through the AVE values of the constructs. The AVE was above 0.5 for all but FAM. An iterative process was used to improve the AVE of FAM by removing the lowest loading factor, FAM2, and then FAM3. Removing these two observed variables brought the AVE to 0.499, right at the 0.500 threshold (Hair et al., 2018). Finally, the CR and Cronbach's alpha values are all above 0.7 (Hair et al., 2018).

The reliability and validity results can be found in Table 15, with the final CFA model in Figure 7.

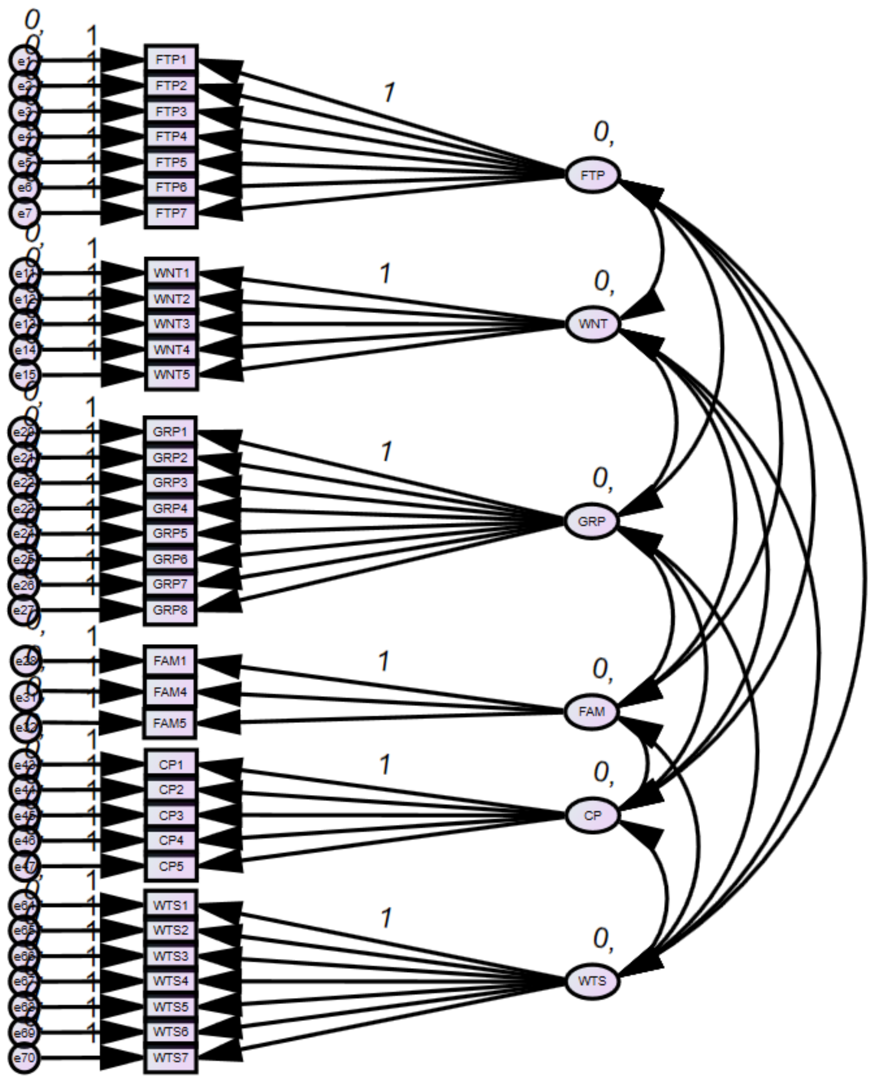
Table 15

Reliability and Validity – Calibration Data Set

Factor	Item	Factor Loading	AVE	MSV	Cronbach's Alpha	CR
Future Time Perspective	FTP1	0.839	0.617	0.735	0.917	0.919
	FTP2	0.845				
	FTP3	0.837				
	FTP4	0.744				
	FTP5	0.840				
	FTP6	0.821				
	FTP7	0.802				
Wariness of New Technology	WNT1	0.771	0.573	0.589	0.868	0.869
	WNT2	0.850				
	WNT3	0.835				
	WNT4	0.751				
	WNT5	0.835				
General Risk Propensity	GRP1	0.753	0.525	0.735	0.868	0.898
	GRP2	0.779				
	GRP3	0.775				
	GRP4	0.734				
	GRP5	0.707				
	GRP6	0.692				
	GRP7	0.606				
	GRP8	0.662				
Familiarity	FAM1	0.823	0.499	0.742	0.749	0.749
	FAM4	0.817				
	FAM5	0.809				
Complexity Perception	CP1	0.778	0.541	0.589	0.854	0.855
	CP2	0.797				
	CP3	0.802				
	CP4	0.825				
	CP5	0.774				
Willingness to Support	WTS1	0.737	0.518	0.742	0.835	0.883
	WTS2	0.813				
	WTS3	0.658				
	WTS4	0.790				
	WTS5	0.698				
	WTS6	0.671				
	WTS7	0.717				

Figure 7

Final Calibration Data Set CFA Model

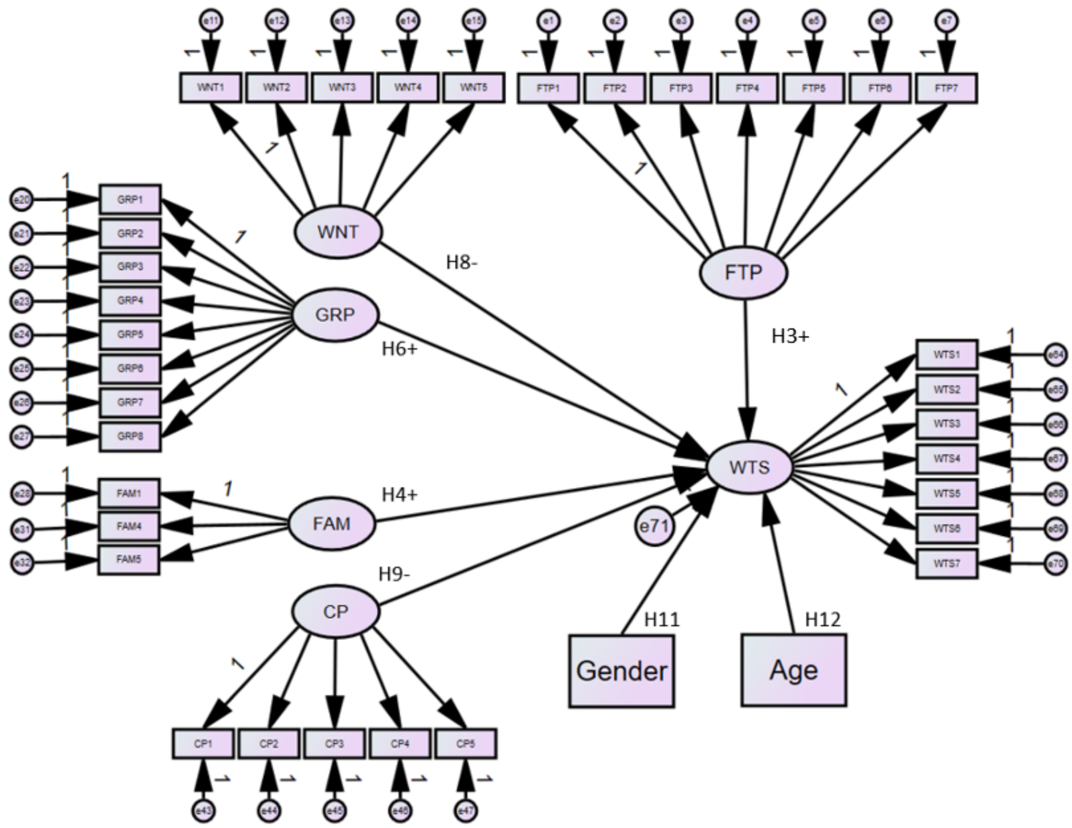


Stage 1 – Calibration Data Set Full Structural Model

The CFA evaluated the latent variables and their relationships. The full structural model was analyzed to facilitate hypothesis testing. Testing the hypotheses allowed the researcher to determine if the theoretical model was accurate to the observed data (Hair et al., 2018). The final structural model with hypotheses is shown in Figure 8.

Figure 8

Structural Equation Model



Note: Several hypotheses are not listed as their constructs were removed during the CFA; (+) indicates a positive hypothesized relationship; (-) indicates a negative hypothesized relationship. Covariances not shown for clarity.

The SEM model was analyzed using AMOS 27. The initial model demonstrated excellent model fit, eliminating the need to re-specify the model further. Therefore, the model was accepted as the final structural model. The goodness of fit indices can be seen in Table 16.

Table 16

Goodness of Fit Indices – SEM Calibration Data Set

Measure	Ideal Value	Initial Value	Interpretation
CMIN/DF	3 > 1	1.630	Excellent
CFI	>0.95	0.966	Excellent
SRMR	<0.08	0.039	Excellent
RMSEA	<0.06	0.034	Excellent
PClose	>0.05	1.000	Excellent

Note: Thresholds from "Cutoff Criteria for Fit Indexes in Covariance Structure Analysis: Conventional Criteria Versus New Alternatives by L. Hu and P.M. Bentler, 1999, *Structural Equation Modeling: A Multidisciplinary Journal*, *6*(1), 1–55. (https://doi.org/10.1080/10705519909540118).

The hypotheses were tested using their standardized regression weight on the dependent variable, WTS. The standardized regression weight indicates the strength and direction of the relationship, while the *p*-value indicates statistical significance, and the C.R., or *t*-value, indicates support for the hypothesis if the value is ≥ ± 1.96 (Byrne, 2016). The final model explained 87.5% of the variance in WTS. The hypotheses of the calibration data set are summarized in Table 17, and the final SEM model with factor loadings can be seen in Figure 9.

Table 17

Hypotheses and Hypothesis Testing Calibration Data Set

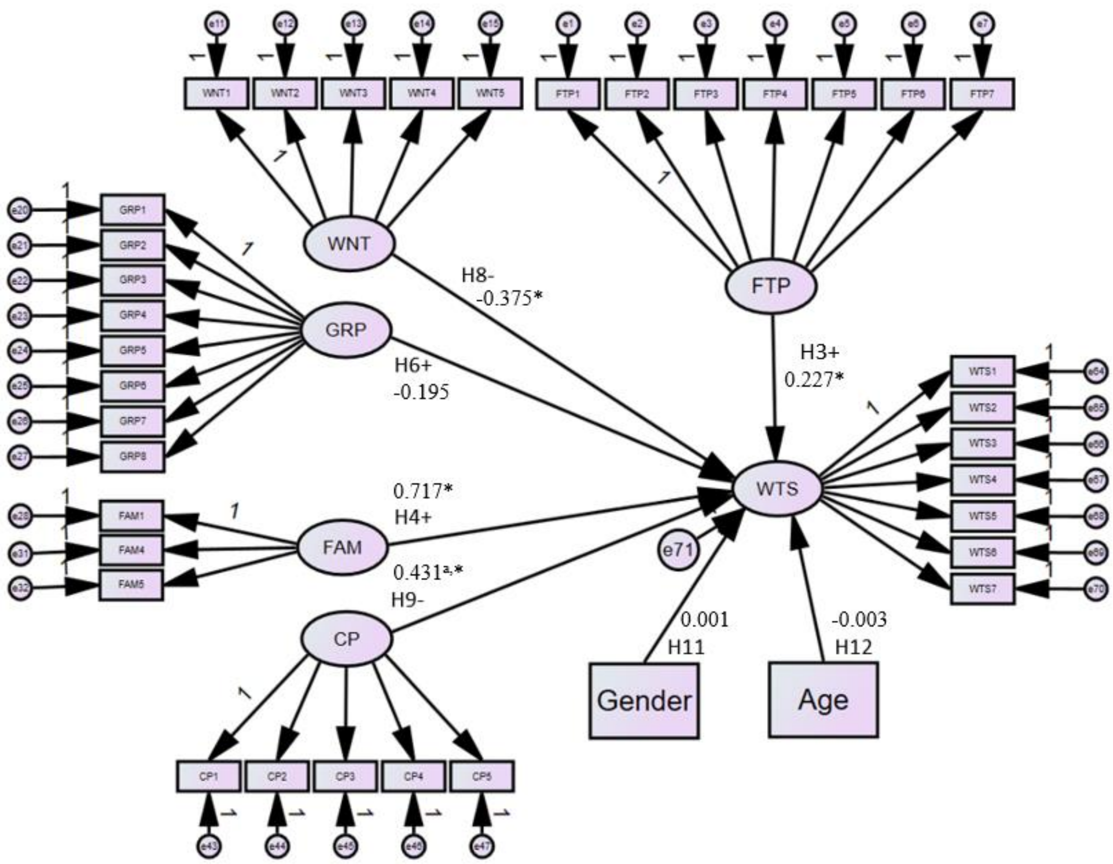
Hyp.	Relationship	Standardized Regression Weight	*p*-value	*t*-value	Conclusion
H_1	TIG (+) → WTS	-	-	-	Not Tested
H_2	AFF (+) → WTS	-	-	-	Not Tested
H_3	FTP (+) → WTS	0.227	<0.001	4.458	Supported
H_4	FAM (+) → WTS	0.717	<0.001	6.653	Supported
H_5	ATSE (+) → WTS	-	-	-	Not Tested

Hyp.	Relationship	Standardized Regression Weight	*p*-value	*t*-value	Conclusion
H_6	GRP (+) → WTS	-0.195	0.053	-1.935	Not Supported
H_7	PV (+) → WTS	-	-	-	Not Tested
H_8	WNT (-) → WTS	-0.375	<0.001	-5.855	Supported
H_9	CP (-) → WTS	0.431	<0.001	5.646	Not Supported[a]
H_{10}	FF (+) → WTS	-	-	-	Not Tested
H_{11}	Males → WTS	0.001	0.976	0.031	Not Supported
H_{12}	Younger → WTS	-0.003	0.285	-1.068	Not Supported

Note: (+) indicates a positive hypothesized relationship; (-) indicates a negative hypothesized relationship. [a] Relationship in the opposite direction than hypothesized.

Figure 9

Calibration Structural Equation Model with Standardized Factor Loadings



Note: Standardized regression weights are provided. * Significant at the level of 0.001. [a] Significant but in the opposite direction than hypothesized. Covariances not shown for clarity.

Stage 2 – Validation Data Set

After the final structural model from Stage 1 was accepted, the model was tested for its equivalence across the calibration and validation samples. To cross-validate the model, the researcher used an invariance-testing strategy to test the replicability of a full structural equation model across groups, as described by Byrne (2016). The full structural model developed in Stage 1 was tested against an independent sample in the validation data set. The final best fitting model of the hypothesized model is shown in Figure 9.

As suggested by Byrne (2016), an initial testing of goodness of fit indices was conducted on the validation data set using the structural model developed in Stage 1. The validation data set on the SEM model demonstrated excellent model fit, suggesting the data fits the postulated model well. The goodness of fit indices for the validation data set can be seen in Table 18.

Table 18

Goodness of Fit Indices – SEM Validation Data Set

Measure	Ideal Value	Calibration Values	Validation Values	Interpretation
CMIN/DF	3 > 1	1.630	1.685	Excellent
CFI	>0.95	0.966	0.963	Excellent
SRMR	<0.08	0.039	0.039	Excellent
RMSEA	<0.06	0.034	0.025	Excellent
PClose	>0.05	1.000	1.000	Excellent

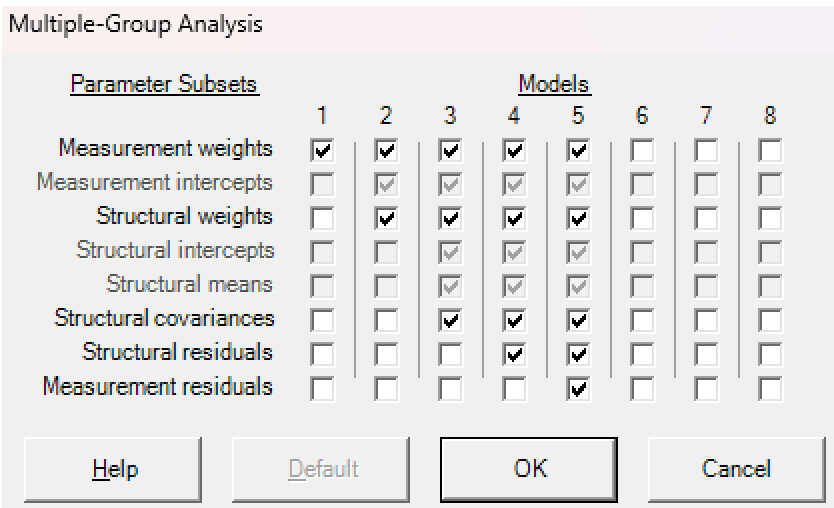
Note: Thresholds from "Cutoff Criteria for Fit Indexes in Covariance Structure Analysis: Conventional Criteria Versus New Alternatives by L. Hu and P.M. Bentler, 1999, *Structural Equation Modeling: A Multidisciplinary Journal*, *6*(1), 1–55. (https://doi.org/10.1080/10705519909540118).

A review of the validation data set's parameter estimates and modification indices yielded no significant concerns. Thus, the full structural model was used, as shown in Figure 9, to test for invariance across the calibration and validation samples. The AMOS Multiple Group Analysis tool was used to conduct the analysis. As described in Chapter

III, five models were evaluated, with each model being more constrained than the previous model. Figure 10 shows the multi-group analysis tool and summarizes the five models and the constraints applied.

Figure 10

Multiple-Group Analysis Constraints



The analysis revealed that the model is completely and totally invariant across the validation and calibration data sets. This is demonstrated by the ΔCFI values being < 0.01 throughout the five models (Cheung & Rensvold, 2002). Therefore, it was concluded that all loadings, paths, covariances, residual variances, and measurement variances were equal among the two groups. The full model baseline comparison can be found in Table 19.

Table 19

Model Baseline Comparisons

Model	NFI Delta1	RFI Rho1	IFI Delta2	TLI Rho2	CFI
Unconstrained	.914	.905	.963	.959	.963
Measurement weights	.912	.906	.963	.960	.963
Structural weights	.912	.906	.963	.960	.962
Structural covariances	.910	.906	.962	.960	.962
Structural residuals	.910	.906	.962	.960	.962
Unconstrained	.914	.905	.963	.959	.963

The model was successfully replicated in the calibration data set. Given the iterative process used to determine the final SEM model, there is a risk of overfitting. Overfitting typically occurs when the data set used to develop the baseline model yields optimistic results, such as a high *R*-squared value and low *p*-values but fails to replicate the findings on another sample. The failure to replicate suggests that the model may not be generalizable to other similar populations (Babyak, 2004; Hawkins, 2004). However, the successful replication of the results in the validation data set, while maintaining a high *R*-squared value. This outcome provides strong evidence that the model, despite its complexity, accurately captures the patterns across different samples. Therefore, the researcher has confidence that the predictive model is not overfit and the final accepted model is valid.

Summary

Chapter IV provided an overview of the analysis of the research for the current study and the results. A convenience sample of 1,110 participants was surveyed as part of the main study. The data was randomly separated into the calibration and validation data sets to facilitate the two-stage process. The CFA demonstrated good model fit, but issues with discriminate validity required the researcher to use an HTMT analysis. An iterative process resulted in seven of the 12 predictor factors remaining for the full structural model. The SEM model demonstrated good model fit, so hypothesis testing could be conducted. Three of the hypotheses were supported, with one being statistically significant but in the opposite direction than hypothesized. The final model explained 87.5% of the variance in the endogenous variable, WTS.

The final SEM model was then used with the validation data set to verify the replication of the model. The validation data set demonstrated excellent model fit when used with the SEM model from Stage 1. A multi-group analysis was conducted to test for invariance across the calibration and validation data sets. The models were totally invariant, as evident by the ΔCFI values being < 0.01 throughout the five models (Cheung & Rensvold, 2002). The validation data set replicated the hypothesis testing of the calibration data set with one additional supported hypothesis. Chapter V will discuss these results, conclusions, and recommendations.

Chapter V: Discussion, Conclusions, and Recommendations

Chapter V provides a comprehensive discussion on the findings from this study. The start of Chapter V provides an in-depth analysis of the research questions and hypotheses central to consumer's willingness to support NASA's Artemis mission. Next, the conclusions will be discussed, including theoretical and practical implications of the research, along with the limitations of the findings. Finally, detailed recommendations will be provided for the space industry and future research based on the findings.

Discussion

The study explored two research questions. The first aimed to develop a theoretical model to identify factors contributing to an individual's support of NASA's Artemis mission, and the second asked if the model could be replicated on a different dataset. There were 12 hypotheses that were presented for the study, with seven being tested in the final model. The final model revealed four factors that explained 87.5% of the variance in WTS. Additionally, the model was validated in the second stage.

Research Question 1

The first research question asked what factors are associated with an individual's support of NASA's Artemis mission. This research question was answered through the exploration of 12 hypotheses. The initial hypothesized model contained 12 predictors of WTS. The iterative process described in Chapter IV removed five predictors (ASTE, PV, FF, TIG, and AFF) during analysis. The final hypothesized structural model contained five exogenous variables (FTP, WNT, GRP, FAM, and CP), two observed variables (Gender and Age), and the endogenous variable, WTS. Seven of the 12 hypotheses were tested on the final structural model. A summary of the hypotheses testing can be found in Table 17 (see Chapter IV).

Untested Hypotheses. Five of the twelve hypotheses were not tested because their latent constructs were removed during the analysis. The removal of TIG, Affect, ASTE, PV, and FF were justified through careful examination of the literature, focused on the theoretical framework (Vigoda, 2002) of the study. The first hypothesis, H_1, said TIG would be positively associated WTS. TIG was removed during the HTMT analysis due to its high correlation with AFF and WTS. Additionally, the Heywood case that remained with TIG made it a prime candidate to remove to ensure the final model would meet discriminate validity.

The second hypothesis, H_2, explored the relationship of affect on WTS. AFF was highly correlated with TIG and WTS and was also removed during the HTMT analysis. While AFF was a significant predictor in several studies (Anania et al, 2018; Angie et al., 2011; Bergstrom & McCaul, 2004; Crouse et al., 2021; Dickert, 2009; Diener & Emmons, 1984; Hohenberger et al., 2016; Isen & Means, 1983; Lamb et al., 2021; Mehta et al., 2021; Rains et al., 2017; Ragbir et al., 2021; Raghunathan & Pham, 1999; Watson et al., 1988; Winter et al., 2017; Rice & Winter, 2015b, 2019; Winter et al., 2015, 2017), it was often as a mediator between variables. The current study used AFF as an exogenous variable on WTS and could not be used as a mediator in the structural model. Future research should explore how affect mediates the relationships in the finalized structural model.

The third untested hypothesis was H_5, which explored an individual's attitudes towards space exploration. The ASTE construct did not hold as a variable in the model.

The AVE of ASTE was only 0.372, below Hair et al.'s (2018) recommended value of 0.500. ASTE is also highly correlated with GRP, PV, FF, and CP. When exploring the ASTE construct against the highly correlated variables, it was obvious that the ASTE questions replicated questions from each of the four highly correlated variables. For example, ASTE asks questions about risk similar to GRP and about value, similar to PV. The combination of the low AVE and the high correlation resulted in ASTE being removed from analysis.

Hypothesis seven examined PV's association with WTS and the tenth hypothesis looked at FF's association with WTS. FAM, PV, and FF were found to be highly correlated with each other in the HTMT analysis. The three constructs have similarities in their observed variables, which could explain why they are highly correlated. FAM explores knowledge and interest, PV explores benefits and usefulness, while FF explores interest and desire. While exploring this group theoretically, Vigoda (2002) suggested that people should be involved in governing themselves. FAM, PV, and FF are all like the PSP construct, focused on satisfaction with services and operations. After exploring each construct in depth and with the iterative approach in the HTMT analysis, both PV and FF were removed from the final structural model, leaving FAM to be tested.

Tested Hypotheses. The final accepted structural model (see Figure 8) was used to test the seven remaining hypotheses. Three of the seven hypotheses were supported, with one being statistically significant in the opposite direction than hypothesized. The results of the hypothesis testing can be found in Table 17 (see Chapter IV).

The first hypothesis tested was H_3, which stated FTP would be positively associated with willingness to support Artemis and was supported by the model. FTP explores how individuals perceive their future. The literature reveals that individuals view time as a limited resource, being more limited when they are older. One of the key driving factors with space exploration and FTP could be the call from several prominent figures suggesting we need to become an interplanetary species, or humanity will eventually cease to exist. These figures include Elon Musk, Jeff Bezos, and the late Stephen Hawking (Bates, 2017; Kharpal, 2017; Powell, 2019; Selk, 2017). It is possible that individuals who view their future positively feel that Artemis is the program that will allow humankind to start their interplanetary journey. As FTP has been shown to decrease with age (Kessler & Staudinger, 2009; Coudin & Lima, 2011; Grühn et al., 2016; Sharifian, 2017), the younger demographics of the calibration (35.05 years old, *SD* = 7.83) and validation (34.05 years old, *SD* = 8.79) data sets could have caused FTP to remain higher for the studied population.

Next, familiarity with Artemis was examined. The hypothesis stated that familiarity with Artemis will be positively associated with willingness to support Artemis. The model supported this finding and had the largest effect size in the model. As Zajonc (2001) found, repeated exposure to something can cause a form of conditioning to individuals where it positively influences those individuals. Artemis can be found frequently in the news and on social media. The "NASA Effect," derived from the "Greta Thunberg Effect," could also be a driver of familiarity. The “NASA Effect” may be present as more than 100,000 people watched the launch of Artemis 1 in person, with a peak viewership of 884,033 views streaming the launch from official NASA channels. It should be noted that the peak viewership was lower than two other recently streamed space missions. However, the low viewership may be due to the first four launch attempts being scrubbed and the actual launch occurring at 1:47 AM EST. For context, SpaceX's first crewed launch for NASA, Crew Dragon Demo-2, launched at 3:22 PM EST and had 10,123,124 peak viewers, while NASA's Perseverance Rover landing on Mars occurred at 3:55 PM EST and had 4,187,455 peak viewers (Carriço, 2022). A study in 2019 found that 24% of people were very familiar with NASA, 39% somewhat familiar, 15% somewhat unfamiliar, 14% very unfamiliar, and only 7% did not know what NASA was (Statista Research Department, 2023). The results imply that over 60% of respondents were more familiar than unfamiliar with NASA, further suggesting why familiarity was the largest factor in support of Artemis.

The third hypothesis tested was H_6, which asked if GRP is positively associated with support for Artemis. The model did not support this hypothesis. GRP is defined "as a person's cross-situational tendency to engage in behaviors with a prospect of negative consequences such as loss, harm, or failure" (Zhang et al., 2018, p. 153). HSF has inherent risks tied to the activity; however, GRP evaluates an individual's tendency to engage in risky behaviors. It may be that exploring how the individual reacts to a risky endeavor rather than their own risk profile could better answer this question. Engaging in risky behaviors may be more domain-specific and not translate directly into the HSF domain (Figner & Weber, 2011; Hanoch et al., 2006). GRP may play a more significant role as a mediator and should be explored in future studies.

Next, H_8 was examined, which stated that WNT would be negatively associated with willingness to support Artemis. The model supported H_8. Artemis is a highly advanced mission with new technology that has never been tested in a space environment but also reuses several pieces of technology from previous missions. The WNT scale examines an individual's feelings toward new technologies and safety concerns. For context, the study title was NASA's Artemis Mission, and the WNT scale was presented before the full Artemis scenario was introduced. Therefore, it is more focused on technology in general, not specific to Artemis. As people go through their decision-making process, they are focused on whether technology is safe and reliable while presenting minimal risks. HSF is inherently saturated with risk in all stages. The negative influence of WNT on willingness has been seen in several prior willingness studies (Anania, Mehta et al., 2018; Milner et al., 2021; Rice et al., 2019; Rice & Winter, 2019; Winter et al., 2020).

The ninth hypothesis stated that complexity perception will be negatively associated with willingness to support Artemis. This hypothesis was statistically significant but in the opposite direction than hypothesized; therefore, H_9 was not supported by the model. The CP scale measures perceptions related to the general complexities of the Artemis mission. Participants who viewed Artemis as more complex were more supportive of the mission. CP had the second highest effect of statistically significant predictors of support. According to the TAM, ease of use influences the usage of technology. The ease-of-use influence may not be present for Artemis as the participants will not actually use the Artemis technology, only benefit from the mission. Lee and See (2004) found that automated technologies could distract users from complex systems; however, that does not seem to be the case in the current study.

Despite the complex technologies associated with Artemis and its mission, it could be that NASA is sending the correct message to the public to ease their mind. The seeming paradoxical relationship between CP (+) and WNT (-) is an interesting finding.

However, when taking the entire model into account, it makes sense. Those familiar with Artemis may know they are reusing several technologies from previous missions, such as the RS-25 engines from Space Shuttle missions. Their familiarity with Artemis could explain the seemingly paradoxical relationship between CP and WNT. Exploring previous literature reveals that Anania, Mehta et al. (2018) found no impact of CP on willingness to ride in driverless vehicles; however, a later study found complexity positively mediated the relationship between gender and anger as well as gender and fear for willingness to ride in driverless vehicles (Rice & Winter, 2019). More research must be conducted to understand how an individual's perceptions of complexity play into willingness.

The next hypothesis that was tested said males would be significantly more willing to support Artemis than females, which was not supported. Despite research that shows genders use technology differently (Sobieraj & Krämer, 2020) and the Funk and Strauss (2018) findings that, in general, more males supported the space program than women, there seems to be no difference in the current study. Maybe the lack of differences stems from the recent push in American society to improve the disparity between men and women in STEM fields. The lack of gender as a predictor is surprising as it was a common predictor in recent willingness studies found in the literature (Anania, Rice et al., 2018; Crouse et al., 2021; Entradas et al., 2013; Rice & Winter, 2019; Mehta et al., 2021; Milner et al., 2021; Winter et al., 2018, 2019). Additional research should explore the lack of the relationship further in the context of Artemis.

The final hypothesis, H_{12}, said that younger individuals will be significantly more willing to support Artemis than older individuals. The model did not support this hypothesis. While examining literature to support age as a predictor, it was a predictor in only a few willingness studies (Rice et al., 2019; Winter et al., 2019). Perhaps age may better be explored in generational groups instead of as a continuous variable. Generational groups seem to better explore ages associated with different interests (DeMarco & Wright, 2021; Funk & Strauss, 2018). For example, there is a chance that the generation that grew up with the Apollo lunar landings (Baby Boomers and Gen X) are more supportive of Artemis due to nostalgia. Future studies should attempt to use generational groups for analysis.

Research Question 2

The second research question asked if the findings from the calibration data set could be accurately replicated by the validation data set. To answer this question, an invariance-testing strategy examined the replicability of a full structural equation model across groups, as described by Byrne (2016). The model developed in Stage 1 was used with the calibration data set to validate the Stage 1 model. When the calibration data set was loaded into the model, an initial goodness of fit was conducted, which was all excellent, without any modifications necessary. Byrne (2016) considers it important to test for validity after establishing the baseline model before the invariance testing.

The model replicated over the five different groups, each more constrained than the previous. The various models impose parameter subset constraints to explore if all groups share the same path diagram. The model baseline comparisons (see Table 19 in Chapter IV) revealed very little change in the values between each model. The first model added the measurement weights, which are regression weights, in the measurement part of the model—the second added the regression weights in the structural part of the model. The next constraint added the variances and covariances in the structural part of the model. The fourth then adds the variances and covariances of residual (error) variables in the structural part of the model. The final model adds variances and covariances of residual (error) variables in the measurement part of the model. Each model becomes progressively more restrictive, allowing researchers to see if their model will replicate throughout each instance. Invariance was obtained as the ΔCFI values were < 0.01 (Cheung & Rensvold, 2002) among the five models. This suggests that it could replicate throughout despite constraining the model in several different ways. Since the ΔCFI values were < 0.01, no further analysis was needed to determine invariance. The model replication suggests that the data replicates freely without error, thus validating the model developed in Stage 1.

Conclusions

The current study aimed to create a predictive model of the type of person who supports NASA's Artemis mission and validate the model. Through an exhaustive review of willingness studies from aviation and aerospace, 12 possible predictors were explored, grounded in literature, to gauge the American public's willingness to support Artemis. Several of the constructs in the study had discriminant validity concerns, which required an HTMT analysis. The HTMT analysis resulted in seven of the 12 predictors being used in the final structural model. The study identified four significant predictors (in order of effect size, FAM, CP, WNT, and FTP) that explained 87.5% of the variance in WTS. The final structural model was successfully validated, indicating that the theoretical model is sound. The theoretical and practical implications are discussed next.

Theoretical Implications

As the current study was exploratory research to identify factors that predict support for Artemis, the theoretical model developed in Stage 1 and replicated in Stage 2 provides a model that can be examined in future studies. The model identifies four factors (FAM, CP, WNT, and FTP) that influence support of Artemis, explaining 87.5% of the variance. The study contributes to the body of knowledge, providing a novel extension of Vigoda's (2002) expansion of democratic theory (Pateman, 1970) into the space industry, specifically NASA's Artemis mission. The model expands the typical application of Vigoda (2002) from terrestrial public services to explore how these concepts apply to the space industry. This application uncovered unique insights towards the public attitudes of NASA's Artemis mission. Additionally, it provides a new theoretical model rooted in Vigoda (2002) and the democratic theory (Pateman, 1970), that can be applied to space exploration.

Vigoda found a paradoxical relationship between public sector performance and individual's active citizen involvement, suggesting individuals support agencies while being operated correctly. The PSP and ACI paradoxical relationship could explain the CP (+) and WNT (-) paradoxical relationship established in the model. The PSP could be represented by the CP, and ACI could be represented by WNT. Exploring these items further, PSP is a citizen's satisfaction with service and operations (Vigoda, 2002), which could be why those who view Artemis as complex are more supportive. Alternatively, ACI is people's engagement in activities such as supporting (Vigoda, 2002), and those who are wary of new technologies are less supportive of Artemis. These dynamic relationships could mirror why individuals who feel they can influence government agencies do not need to use their voice if the agency operates correctly (Vigoda, 2002); Artemis 1 was wildly successful and did not result in any failures. The reuse of technology in Artemis allows citizens who are wary of new technology to have assurance that Artemis is safe despite being highly complex. Additional research should explore these relationships to establish a better understanding of the interactions.

The study establishes a baseline theoretical model that can be used in future studies on different populations to determine if the model can hold outside of the current studies' population. Additionally, the study adds to the body of knowledge by supporting various willingness studies. The exhaustive review conducted on willingness studies directly helped develop the hypothesized model for the current study. The discriminate validity concerns identified several highly correlated factors. Additional models that further investigate the high correlations among the items should be explored. Previous research did not identify discriminate validity issues on willingness models.

Practical Implications

To date, no study can be found that identifies factors associated with support for Artemis. The current study is the first comprehensive analysis identifying the factors influencing public support for NASA's Artemis Mission. The generalizability of the findings is limited to the population of MTurk but may have broader applications for NASA and policymakers. The identified factors offer a novel lens through which NASA can strategize to bolster public support, a perspective that previous research has not provided. Several practical implications for the results of the current study are discussed.

First and foremost, the study's findings can help policy and decision-makers at NASA and other government agencies. The findings can inform the policy and decision-makers about the factors influencing public support for Artemis. Understanding that FAM, CP, WNT, and FTP can help guide the communication strategies used to better inform the public about Artemis and possibly other similar programs. NASA could use the findings to develop targeted outreach and educational strategies, including multimedia content, public speaking engagements, and collaborative projects with academia.

NASA's public relations department can shape its marketing strategies. Understanding the impact of CP and WNT on support would allow for a simplified message for the public that may be better received. Artemis has only had one successful launch to date. NASA can improve the message sent to taxpayers as it prepares for the crewed Artemis 2 mission. The positive impact of CP on support could allow for the messaging to use layperson's terms to make the technology more accessible to a broader range of the public. Additionally, NASA can reassure the public and address common concerns about new space technologies to lessen the negative influence of WNT.

Policymakers can use the findings to advocate for funding related to space exploration, particularly HSF and other Artemis missions. As the current study is the first study to date to identify the factors that influence support, the factors identified can help lobbyists streamline their message and advocate for the public. Continued interest and public support are paramount to continue and increase funding from the government.

The role of FAM and FTP's influence on support demonstrates how essential education initiatives can be. FAM had the most significant effect size in the final model. NASA could increase collaboration with both secondary and post-secondary educational institutions. The development of a curriculum that highlights space exploration, NASA, Artemis, and the significance of advancing space technology could prove useful. The messaging could help shape FTP among the younger generations to enforce the need for the value of HSF.

The finalized model provides a way to explore other contributing factors and look for mediating effects on willingness. The results from the current study provide a roadmap to provide targeted outreach to improve support of Artemis. The validated model provides the baseline for NASA, policymakers, and other agencies to improve consumer relations. Additionally, the validated model provides a basis for further research in the field. Other researchers can use the model to study support for several types of space missions, including HSF and uncrewed missions. The model can also be used in different populations to understand perceptions of space exploration domestically and internationally.

Lastly, outside of NASA, government agencies, and education, the commercial space industry should leverage the results of the current study. Understanding public sentiments towards NASA's Artemis mission can help develop their own marketing strategies for their own products. Aligning company goals with public interest could increase public support for the company, increase its customer base, and possibly allow for more investors. The findings from the current study provide valuable insights to improve public understanding and support, guide educational and policy efforts, and improve the messaging from NASA and others.

Limitations of the Findings

The current study acknowledges several limitations. The first involves the convenience sample from MTurk. Individuals on the site can explore and select which surveys to take, and they accepted the “NASA’s Artemis Mission” task, which could lead to selection bias. The individual decided to participate solely based on the title, short introduction, compensation, and time needed to complete the study. However, several studies have shown MTurk to be as reliable as laboratory results (Buhrmester et al., 2011; Germine et al., 2012; Mason & Suri, 2012; Rice et al., 2017). The MTurk population that was sampled was dissimilar from the U.S. population, based on the 2020 census. The population discrepancy should be noted as it further reduces the generalizability of the data to the population of MTurk. Replicating the current study to other populations could improve the model's generalizability and external validity.

Recommendations

The final section will provide recommendations to applicable agencies and future research based on the current study.

Recommendations for the Space Industry

First and foremost, NASA can benefit from the current study's findings. The theoretical model identified familiarity as the largest support influencer; therefore, NASA should intensify its drive with community outreach efforts. The outreach should be focused to ensure that Artemis' messaging aligns with the population. Creating and disseminating clear messaging that articulates mission’s objectives, benefits, and milestones to the public can help accomplish this goal. By leveraging NASA’s diverse media platforms, including social media, educational outreach programs, and public events, NASA can ensure that information can reach a broad audience. This effort would ultimately increase the public’s familiarity, and consequently, their support.

The second largest contributor was CP, which was hypothesized to have a negative relationship with WTS; however, it was statistically significant in the opposite direction. The finding indicates that the more complex a person views the technology associated with Artemis, the more they support it. Outreach should focus on providing detailed, accessible information about the Artemis mission. This information could include behind-the-scenes documentaries, technology demonstrations, online webinars, and interactive exhibits at museums across the country. By focusing on the cutting-edge technology and new engineering techniques involved in Artemis, NASA can demystify the complexity and foster a more comprehensive understanding of the program's technology and goals. Further, it would increase their familiarity with Artemis, which could further improve their support.

The negative impact of WNT on WTS suggests that the messaging should be sure to highlight the safety and reliability of space technologies. Communications should include detailed information about the rigorous testing and evaluation that each piece of space technology goes through before it is approved for HSF. The use of success stories and testimonials from engineers developing the technology and astronauts who use the technology can provide reassurance to the public as they are unable to actually use the technology themselves.

Finally, additional messaging should focus on the benefit of the mission, as FTP had a positive impact on WTS. Those who view their future as positive are more willing to support them, therefore, the messaging should focus on the long-term benefits of the Artemis mission. NASA should paint a picture of how Artemis is a critical step towards future HSF, including the eventual goal of creating permanent settlements on Mars.

Focusing on the mission's role of advancing scientific knowledge, fostering international cooperation, and inspiring the next generation of explorers can highlight the positive benefits that Artemis will bring, increasing support.

The private space industry can also use the findings from the current study to enhance their marketing for HSF. The final model of the study provides a starting point to explore if the same factors influence support for private space flight. Winter and Trombley (2020) examined willingness to travel and live on Mars, with FAM and WNT influencing their model. More research into support for these will be essential for the space tourism industry as it evolves.

Recommendations for Future Research

The study results provide several future questions that should be researched and explored to further develop the finalized SEM model and explore other identified relationships. First, the model provided a very high level of variance explained, so future studies should expand the finalized model into additional populations to improve the generalizability of the data. The expansion of the generalizability of the model would allow more informed decision-making at NASA and other organizations. Additionally, the finalized model should be run on the same population after each Artemis mission that launches to explore if people's influence changes based upon the mission. There would likely be less support for Artemis if something catastrophic occurred during a crewed mission.

A qualitative follow-up study could be conducted to explore the interactions of the model further. Determining why the seemingly paradoxical relationship between WNT and CP exists would allow NASA and others to better understand the reasoning behind the support. A comprehensive understanding of the reasoning would further expand the body of knowledge to provide a more complete picture to better inform policymakers on their appropriation packets.

Several other areas of this model could be explored. For example, it would be interesting to identify if the "Greta Thunberg Effect" (Sabherwal et al., 2021) exists in the form of the “NASA’s Artemis Mission Effect.” As FAM was the largest contributor to the model, familiarity with NASA seems to affect willingness but still needs more exploration. GRP was not supported in our current model; however, it may play a mediating effect between WNT and WTS or between FTP and WTS. Additionally, AFF was seen to mediate several relationships in willingness (Anania, Rice et al, 2018; Bergstrom & McCaul, 2004; Hohenberger et al., 2016; Lamb et al., 2021; Mehta et al., 2021; Rains et al., 2017; Ragbir et al., 2021; Winter et al., 2017; Rice & Winter, 2015b, 2019; Winter et al., 2015, 2017) and should also be explored. Several mediation analyses could occur to explore further some of the variables that were removed due to discriminate validity concerns. Since FAM had the largest effect size, a mediation analysis could explore which factors mediate the FAM to WTF relationship. The mediation analysis could provide a better understanding of how the relationship works.

Finally, additional research on age needs to be explored. Age was a predictor in a few willingness studies (Rice et al., 2019; Winter et al., 2019), but the Funk and Strauss (2018) survey identified few differences between generational groups but did find that millennials were more likely to support including astronauts in future missions and that the ISS is worth the investment compared to Gen X and Baby Boomers. This could imply that those who grew up during the construction of the ISS may be influenced in their support by the outreach NASA puts into public schools. Future studies could explore the generational groups through a mixed-methods study to identify if there are differences and better understand why each group's support differs in several critical areas of NASA's programs. The generational information would allow NASA to see their direct impact on age groups in public schooling to determine if it is worth the continued investment.

References

Adams, J. (2021, October 15). *What is the Artemis program?* National Aeronautics and Space Administration. https://www.nasa.gov/audience/forstudents/5-8/features/nasa-knows/what-is-the-artemis-program-58.html

Alhakami, A. S., & Slovic, P. (1994). A psychological study of the inverse relationship between perceived risk and perceived benefit. *Risk Analysis: An Official Publication of the Society for Risk Analysis*, *14*(6), 1085–1096. https://doi.org/10.1111/j.1539-6924.1994.tb00080.x

Anania, E. C., Mehta, R., Marte, D., Rice, S., & Winter, S. R. (2018). Which factors predict consumer willingness to ride in driverless vehicles? *Proceedings of the Human Factors and Ergonomics Society Annual Meeting*, *62*(1), 1378–1382. https://doi.org/10.1177/1541931218621314

Anania, E. C., Rice, S., Walters, N. W., Pierce, M., Winter, S. R., & Milner, M. N. (2018). The effects of positive and negative information on consumers' willingness to ride in a driverless vehicle. *Transport Policy*, *72*, 218–224. https://doi.org/10.1016/j.tranpol.2018.04.002

Anderson, J. C., & Gerbing, D. W. (1988). Structural equation modeling in practice: A review and recommended two-step approach. *Psychological Bulletin*, *103*(3), 411–423. https://doi.org/10.1037/0033-2909.103.3.411

Angie, A. D., Connelly, S., Waples, E. P., & Kligyte, V. (2011). The influence of discrete emotions on judgement and decision-making: A meta-analytic review. *Cognition & Emotion*, *25*(8), 1393–1422. https://doi.org/10.1080/02699931.2010.550751

Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, *50*(2), 179–211. https://doi.org/10.1016/0749-5978(91)90020-T

Ajzen, I., & Fishbein, M. (1980). *Understanding attitudes and predicting social behavior*. Prentice-Hall.

Ajzen, I., & Fishbein, M. (2005). The influence of attitudes on behavior. In D. Albarracín, B. T. Johnson, & M. P. Zanna (Eds.), *The Handbook of Attitudes*, (pp. 173–221). Erlbaum.

Ajzen, I., Fishbein, M., Lohmann, S., & Albarracín, D. (2018). The influence of attitudes on behavior. In D. Albarracín, & B. T. Johnson (Eds.) *The handbook of attitudes: Basic principles* (2nd ed., Vol. 1, pp. 197-255). Routledge.

Babbie, E. R. (2020). *The practice of social research*. Cengage Learning.

Babyak, M. A. (2004). What you see may not be what you get: A brief, nontechnical introduction to overfitting in regression-type models. *Psychosomatic Medicine*, *66*(3), 411–421. https://doi.org/10.1097/01.psy.0000127692.23278.a9

Bachmann, R. (2011). At the crossroads: Future directions in trust research. *Journal of Trust Research*, *1*(2), 203–213. https://doi.org/10.1080/21515581.2011.603513

Balderjahn, I. (2003). *Nachhaltiges Marketing-Management: Möglichkeiten einer umwelt- und sozialverträglichen Unternehmenspolitik*. Lucius & Lucius DE. https://play.google.com/store/books/details?id=ZzlbzGt35VMC

Bates, J. (2017, May 8). *In order to ensure our survival, we must become a multi-planetary species*. Futurism. https://futurism.com/in-order-to-ensure-human-survival-we-must-become-a-multi-planetary-species

Baugh, B. S., Musselman, B. T., Simpson, M., & Winter, S. R. (2018, September 26-28). *Commercial space travel for the masses, but will people ride? A preliminary analysis* [Poster presentation]. University Aviation Association Annual Education Conference, Irving, TX.

Becker, S., Bräscher, A.-K., Bannister, S., Bensafi, M., Calma-Birling, D., Chan, R. C. K., Eerola, T., Ellingsen, D.-M., Ferdenzi, C., Hanson, J. L., Joffily, M., Lidhar, N. K., Lowe, L. J., Martin, L. J., Musser, E. D., Noll-Hussong, M., Olino, T. M., Pintos Lobo, R., & Wang, Y. (2019). The role of hedonics in the human affectome. *Neuroscience and Biobehavioral Reviews*, *102*, 221–241. https://doi.org/10.1016/j.neubiorev.2019.05.003

Bentler, P. M., & Chou, C.-P. (1987). Practical issues in structural modeling. *Sociological Methods & Research*, *16*(1), 78–117. https://doi.org/10.1177/0049124187016001004

Bergstrom, R. L., & McCaul, K. D. (2004). Perceived risk and worry: The effects of 9/11 on willingness to Fly. *Journal of Applied Social Psychology*, *34*(9), 1846–1856. https://doi.org/10.1111/j.1559-1816.2004.tb02588.x

Berinsky, A. J., Huber, G. A., & Lenz, G. S. (2012). Evaluating online labor markets for experimental research: Amazon.com's Mechanical Turk. *Political Analysis: An Annual Publication of the Methodology Section of the American Political Science Association*, *20*(3), 351–368. https://doi.org/10.1093/pan/mpr057

Berman, A.E. (2016, March 22). *Technology feels like it's accelerating — Because it actually is.* Singularity hub. https://singularityhub.com/2016/03/22/technology-feels-like-its-accelerating-because-it-actually-is/

Bollen, K. A. (1989). *Structural equations with latent variables*. John Wiley & Sons.

Bouckaert, G., & van de Walle, S. (2003). Comparing measures of citizen trust and user satisfaction as indicators of "good governance": Difficulties in linking trust and satisfaction indicators. *International Review of Administrative Sciences*, *69*(3), 329–343. https://doi.org/10.1177/0020852303693003

Breidert, C., Hahsler, M., & Reutterer, T. (2006). A review of methods for measuring willingness-to-pay. *Innovative Marketing*. http://www.reutterer.com/papers/breidert&hahsler&reutterer_2006.pdf

Browne, M. W., & Cudeck, R. (1992). Alternative ways of assessing model fit. *Sociological Methods & Research*, *21*(2), 230–258. https://doi.org/10.1177/0049124192021002005

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

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

Byrnes, J. P., Miller, D. C., & Schafer, W. D. (1999). Gender differences in risk taking: A meta-analysis. *Psychological Bulletin*, *125*(3), 367–383. https://doi.org/10.1037/0033-2909.125.3.367

Carriço, F. (2022, November 18). *Artemis 1 launch sets a scenario for a return to the Moon in the near future*. Streams Charts. https://streamscharts.com/news/artemis-1-launch-sets-scenario-return-moon

Carstensen, L. L., & Lang, F. R. (1996). *Future time perspective scale* [Unpublished manuscript]. Stanford University.

Cheung, G. W., & Rensvold, R. B. (2002). Evaluating goodness-of-fit indexes for testing measurement invariance. *Structural Equation Modeling: A Multidisciplinary Journal*, *9*(2), 233–255. https://doi.org/10.1207/S15328007SEM0902_5

Cohen, J. (1962). The statistical power of abnormal-social psychological research: A review. *Journal of Abnormal and Social Psychology*, *65*, 145–153. https://doi.org/10.1037/h0045186

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Lawrence Earlbaum Associates.

Cohen, J. (1992). A power primer. *Psychology Bulletin, 112* (1), 155-159.

Cohen, P., West, S. G., & Aiken, L. S. (2014). *Applied multiple regression/correlation analysis for the behavioral sciences*. Psychology Press.

Coudin, G., & Lima, M. L. (2011). Being well as time goes by: Future time perspective and well-being. *Revista Internacional de Psicologia Y Terapia Psicologica - International Journal of Psychology and Psychological Therapy*, *2*, 219–232. https://repositorio.iscte-iul.pt/handle/10071/9935

Creswell, J. W. (2014). *Research design: Qualitative, quantitative, and mixed methods approaches.* (4th ed.). Sage.

Crouse, S., Bell, K., & Combs, E. (2021). Predicting a consumer's willingness to fly with COVID-19 passport. *International Journal of Aviation Research*, *13*(1). https://ojs.library.okstate.edu/osu/index.php/IJAR/article/view/8396

Davis, F. D. (1985). *A technology acceptance model for empirically testing new end-user information systems: Theory and results* [Doctoral dissertation, Massachusetts Institute of Technology]. DSpace@MIT.https://dspace.mit.edu/bitstream/handle/1721.1/15192/14927137-MIT.pdf

DeMarco, J., & Wright, B. (2021, October 5). *Nearly half of Americans want to travel to space, and some would take on debt to make it happen*. Value Penguin. https://www.valuepenguin.com/travel/americans-space-travel

De Vries, A., Erasmus, P. D., & Gerber, C. (2017). The familiar versus the unfamiliar: Familiarity bias amongst individual investors. *Acta Commercii*, *17*(1), 10. https://doi.org/10.4102/ac.v17i1.366

Diener, E., & Emmons, R. A. (1984). The independence of positive and negative affect. *Journal of Personality and Social Psychology*, *47*(5), 1105–1117. https://doi.org/10.1037/0022-3514.47.5.1105

Dickert, S. (2009). Measuring affect and emotions in decision making: The affective side of intuitive information processing. In A. Glöckner & C. Witteman (Eds.), *Foundations for Tracing Intuition: Challenges and Methods*, 179-198. Psychology Press.

Difallah, D., Filatova, E., & Ipeirotis, P. (2018). Demographics and dynamics of Mechanical Turk workers. *Proceedings of the Eleventh ACM International Conference on Web Search and Data Mining*, 135–143. https://doi.org/10.1145/3159652.3159661

Donaldson, A. (2024, January 9). *NASA shares progress toward early Artemis Moon missions with crew.* National Aeronautics and Space Administration. https://www.nasa.gov/news-release/nasa-shares-progress-toward-early-artemis-moon-missions-with-crew/

Dunbar, B. (2017, August 7). *In the beginning: Project Mercury*. National Aeronautics and Space Administration. https://www.nasa.gov/centers/kennedy/about/history/mercury.html

Dunbar, B. (2021). Human spaceflight. National Aeronautics and Space Administration. https://www.nasa.gov/specials/60counting/spaceflight.html

Edmonds, A. W., & Kennedy, T. D. (2016). *An applied guide to research designs: Quantitative, qualitative, and mixed methods*. SAGE Publications.

Embry-Riddle Aeronautical University. (2022, April 19). *Hangar Talk with Jared Isaacman* [Video]. YouTube. https://www.youtube.com/watch?v=8ziF5iXtu-o

Entradas, M., Miller, S., & Peters, H. P. (2013). Preaching to the converted? An analysis of the UK public for space exploration. *Public Understanding of Science*, *22*(3), 269–286. https://doi.org/10.1177/0963662511411255

Figner, B., & Weber, E. U. (2011). Who takes risks when and why?: Determinants of risk taking. *Current Directions in Psychological Science*, *20*(4), 211–216. https://doi.org/10.1177/0963721411415790

Farooq, R. (2022). Heywood cases: Possible causes and solutions. *International Journal of Data Analysis Techniques and Strategies*, *14*(1), 79–88. https://doi.org/10.1504/IJDATS.2022.121506

Fisher, J., Van Heerde, J., & Tucker, A. (2010). Does one trust judgement fit all? Linking theory and empirics. *British Journal of Politics and International Relations*, *12*(2), 161–188. https://doi.org/10.1111/j.1467-856X.2009.00401.x

Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *JMR, Journal of Marketing Research*, *18*(1), 39–50. https://doi.org/10.1177/002224378101800104

Fritz, C. O., Morris, P. E., & Richler, J. J. (2012). Effect size estimates: Current use, calculations, and interpretation. *Journal of Experimental Psychology. General*, *141*(1), 2–18. https://doi.org/10.1037/a0024338

Frohlich, M. T., & Dixon, J. R. (2006). Reflections on replication in OM research and this special issue. *Journal of Operations Management*. https://onlinelibrary.wiley.com/doi/abs/10.1016/j.jom.2005.11.001

Funk, C. & Strauss, M. (2018, June 6). *Majority of Americans believe it is essential that the U.S. remain a global leader in space*. Pew Research Center. https://www.pewresearch.org/science/2018/06/06/majority-of-americans-believe-it-is-essential-that-the-u-s-remain-a-global-leader-in-space/

Furby, L., & Beyth-Marom, R. (1992). Risk taking in adolescence: A decision-making perspective. *Developmental Review*, *12*(1), 1–44. https://doi.org/10.1016/0273-2297(92)90002-j

Garber, S. (2015, September 10). *Apollo-1 (204).* National Aeronautics and Space Administration. https://history.nasa.gov/Apollo204/

Gärling, T. (1989). The role of cognitive maps in spatial decisions. *Journal of Environmental Psychology*, *9*(4), 269–278. https://doi.org/10.1016/S0272-4944(89)80009-X

Gaskin, J. (2022). *Data prep*. Gaskination. https://statwiki.gaskination.com/index.php?title=Data_Prep

Gaskin, J., James, M., & Lim, J. (2019). *Master validity tool: AMOS plugin*. [Computer software]. Gaskination. http://statwiki.gaskination.com/index.php?title=Plugins

Germine, L., Nakayama, K., Duchaine, B. C., Chabris, C. F., Chatterjee, G., & Wilmer, J. B. (2012). Is the web as good as the lab? Comparable performance from web and lab in cognitive/perceptual experiments. *Psychonomic Bulletin & Review*, *19*(5), 847–857. https://doi.org/10.3758/s13423-012-0296-9

Grady, C. (2015). Institutional review boards: Purpose and challenges. *Chest*, *148*(5), 1148–1155. https://doi.org/10.1378/chest.15-0706

Granath, B. (2017, August 7). *Theodore Freeman honored in 50th anniversary memorial ceremony*. National Aeronautics and Space Administration. https://www.nasa.gov/people-of-nasa/kennedy-space-centers-nasa-day-of-remembrance-honors-fallen-astronauts/

Green, C. M., & Lomask, M. (2012). *Vanguard: A history*. National Aeronautics and Space Administration. https://history.nasa.gov/SP-4202/toc2.html

Grimmelikhuijsen, S. G. & Knies, E. (2015). Validating a scale for citizen trust in government organizations. *International Review of Administrative Sciences.* https://doi.org/10.1177/0020852315585950

Grühn, D., Sharifian, N., & Chu, Q. (2016). The limits of a limited future time perspective in explaining age differences in emotional functioning. *Psychology and Aging*, *31*(6), 583–593. https://doi.org/10.1037/pag0000060

Hair, J. F. (2009). *Multivariate Data Analysis*. https://digitalcommons.kennesaw.edu/facpubs/2925/

Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2018). *Multivariate data analysis: Global edition*. Pearson Higher Education.

Hartig, H., Daniller, A., Keeter, S., & Van Green, T. (2023, July 13). *Republican gains in 2022 midterms driven mostly by turnout advantage*. Pew Research Center. https://www.pewresearch.org/politics/2023/07/12/republican-gains-in-2022-midterms-driven-mostly-by-turnout-advantage/

Hanoch, Y., Johnson, J. G., & Wilke, A. (2006). Domain specificity in experimental measures and participant recruitment: An application to risk-taking behavior.

Psychological Science, *17*(4), 300–304. https://doi.org/10.1111/j.1467-9280.2006.01702.x

Harbaugh, J. (2017, August 3). *Biography of Wernher Von Braun*. National Aeronautics and Space Administration. https://www.nasa.gov/centers/marshall/history/vonbraun/bio.html

Hardin, R. (1993). The street-level epistemology of trust. *Politics & Society*, *21*(4), 505–529. https://doi.org/10.1177/0032329293021004006

Harman, H. H., & Fukuda, Y. (1966). Resolution of the Heywood case in the minres solution. *Psychometrika*, *31*(4), 563–571. https://doi.org/10.1007/BF02289525

Hawkins, D. M. (2004). The problem of overfitting. *Journal of Chemical Information and Computer Sciences*, *44*(1), 1–12. https://doi.org/10.1021/ci0342472

Henseler, J., Ringle, C. M., & Sarstedt, M. (2015). A new criterion for assessing discriminant validity in variance-based structural equation modeling. *Journal of the Academy of Marketing Science*, *43*(1), 115–135. https://doi.org/10.1007/s11747-014-0403-8

Heywood, H. B., & Filon, L. N. G. (1997). On finite sequences of real numbers. *Proceedings of the Royal Society of London. Series A, Containing Papers of a Mathematical and Physical Character*, *134*(824), 486–501. https://doi.org/10.1098/rspa.1931.0209

Hohenberger, C., Spörrle, M., & Welpe, I. M. (2016). How and why do men and women differ in their willingness to use automated cars? The influence of emotions across different age groups. *Transportation Research Part A: Policy and Practice*, *94*, 374–385. https://doi.org/10.1016/j.tra.2016.09.022

Hooghe, M. (2011). Why there is basically only one form of political trust. *British Journal of Politics and International Relations*, *13*(2), 269–275. https://doi.org/10.1111/j.1467-856X.2010.00447.x

Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling: A Multidisciplinary Journal*, *6*(1), 1–55. https://doi.org/10.1080/10705519909540118

Hubbard, R., Vetter, D. E., & Little, E. L. (1998). Replication in strategic management: scientific testing for validity, generalizability, and usefulness. *Strategic Management Journal*, *19*(3), 243–254. https://doi.org/10.1002/(sici)1097-0266(199803)19:3<243::aid-smj951>3.0.co;2-0

Husman, J., & Shell, D. F. (2008). Beliefs and perceptions about the future: A measurement of future time perspective. *Learning and Individual Differences*, *18*(2), 166–175. https://doi.org/10.1016/j.lindif.2007.08.001

Isen, A. M., & Means, B. (1983). The influence of positive affect on decision-making strategy. *Social Cognition*, *2*(1), 18–31. https://doi.org/10.1521/soco.1983.2.1.18

Jenkin, C. M. (2006). Risk perception and terrorism: Applying the psychometric paradigm. *Homeland Security Affairs*, *2*(2). https://core.ac.uk/download/pdf/36718236.pdf

Johnson, C. (2019, July 17). *How Americans see the future of space exploration, 50 years after the first moon landing*. Pew Research Center. https://www.pewresearch.org/fact-tank/2019/07/17/how-americans-see-the-future-of-space-exploration-50-years-after-the-first-moon-landing/

Kaplan, D. (2008). *Structural equation modeling: Foundations and extensions*. SAGE Publications.

Kauffman, J. (2001). A successful failure: NASA's crisis communications regarding Apollo 13. *Public Relations Review*, *27*(4), 437–448. https://doi.org/10.1016/s0363-8111(01)00099-6

Kessler, E. M., & Staudinger, U. M. (2009). Affective experience in adulthood and old age: The role of affective arousal and perceived affect regulation. *Psychology and Aging*, *24*(2), 349–362. https://doi.org/10.1037/a0015352

Keyes, K. M., Utz, R. L., Robinson, W., & Li, G. (2010). What is a cohort effect? Comparison of three statistical methods for modeling cohort effects in obesity prevalence in the United States, 1971-2006. *Social Science & Medicine*, *70*(7), 1100–1108. https://doi.org/10.1016/j.socscimed.2009.12.018

Kharpal, A. (2017, May 5). *Stephen Hawking says humans must colonize another planet in 100 years or face extinction*. CNBC. https://www.cnbc.com/2017/05/05/stephen-hawking-human-extinction-colonize-planet.html

Kline, R. B. (2015). *Principles and practice of structural equation modeling* (4thed.). Guilford Publications. https://play.google.com/store/books/details?id=Q61ECgAAQBAJ

Kwan, J. L. Y., & Chan, W. (2011). Comparing standardized coefficients in structural equation modeling: A model reparameterization approach. *Behavior Research Methods*, *43*(3), 730–745. https://doi.org/10.3758/s13428-011-0088-6

Lamb, T. L., Ruskin, K. J., Rice, S., Khorassani, L., Winter, S. R., & Truong, D. (2021). A qualitative analysis of social and emotional perspectives of airline passengers during the COVID-19 pandemic. *Journal of Air Transport Management*, 102079. https://doi.org/10.1016/j.jairtraman.2021.102079

Lang, F. R., & Carstensen, L. L. (2002). Time counts: Future time perspective, goals, and social relationships. *Psychology and Aging*, *17*(1), 125–139. https://doi.org/10.1037/0882-7974.17.1.125

Launius, R. D. (2003). Public opinion polls and perceptions of US human spaceflight. *Space Policy*, *19*(3), 163–175. https://doi.org/10.1016/S0265-9646(03)00039-0

Lee, J., & Moray, N. (1992). Trust, control strategies and allocation of function in human-machine systems. *Ergonomics*, *35*(10), 1243–1270. https://doi.org/10.1080/00140139208967392

Lee, J. D., & See, K. A. (2004). Trust in automation: Designing for appropriate reliance. *Human Factors*, *46*(1), 50–80. https://doi.org/10.1518/hfes.46.1.50_30392

Lewicki, R. J., & Bunker, B. B. (1995). Trust in relationships: A model of development and decline. *Conflict, Cooperation, and Justice: Essays Inspired by the Work of Morton Deutsch*, *441*, 133–173.

Lewicki, R. J., McAllister, D. J., & Bies, R. J. (1998). Trust and distrust: New relationships and realities. *The Academy of Management Review*, *23*(3), 438–458. https://doi.org/10.5465/amr.1998.926620

Lincoln, Y. S., & Tierney, W. G. (2004). Qualitative research and institutional review boards. *Qualitative Inquiry: QI*, *10*(2), 219–234. https://doi.org/10.1177/1077800403262361Loff, S. (2017). *About Project Mercury*. National Aeronautics and Space Administration. https://www.nasa.gov/mission_pages/mercury/missions/program-toc.html

MacCallum, R. C., Browne, M. W., & Sugawara, H. M. (1996). Power analysis and determination of sample size for covariance structure modeling. *Psychological Methods*, *1*(2), 130–149. https://doi.org/10.1037/1082-989X.1.2.130

Maksel, R. (2013, June 7). *The Astronaut Wives Club*. Smithsonian Magazine. https://www.smithsonianmag.com/air-space-magazine/the-astronaut-wives-club-96200525/

Malmqvist, J., Hellberg, K., Möllås, G., Rose, R., & Shevlin, M. (2019). Conducting the pilot study: A neglected part of the research process? Methodological findings supporting the importance of piloting in qualitative research studies. *International Journal of Qualitative Methods*, *18*, 160940691987834. https://doi.org/10.1177/1609406919878341

Marconi, E. M. (2004, March 9). *Robert Goddard: A man and his rocket*. National Aeronautics and Space Administration. https://www.nasa.gov/missions/research/f_goddard.html

Mars, K. (2021, March 1). *55 years ago: Remembering Elliot See and Charles Bassett*. National Aeronautics and Space Administration.

https://www.nasa.gov/feature/55-years-ago-remembering-elliot-see-and-charles-bassett

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

Mayer, R. C., Davis, J. H., & Schoorman, F. D. (1995). An integrative model of organizational trust. *The Academy of Management Review*, *20*(3), 709–734. https://doi.org/10.5465/amr.1995.9508080335

McAllister, D. J. (1995). Affect- and cognition-based trust as foundations for interpersonal cooperation in organizations. *Academy of Management Journal*, *38*(1), 24–59. https://doi.org/10.5465/256727

McGraw, A. P., Larsen, J. T., Kahneman, D., & Schkade, D. (2010). Comparing gains and losses. *Psychological Science*, *21*(10), 1438–1445. https://doi.org/10.1177/0956797610381504

Mehta, R., Rice, S., Winter, S., & Eudy, M. (2017). Perceptions of Cockpit Configurations: A Culture and Gender Analysis. *The International Journal of Aerospace Psychology*, *27*(1-2), 57–63. https://doi.org/10.1080/10508414.2017.1365609

Mehta, R., Rice, S., Winter, S., Spence, T., Edwards, M., & Candelaria-Oquendo, K. (2019). Generalizability of effect sizes within aviation research: More samples are needed. *International Journal of Aviation, Aeronautics, and Aerospace*, *6*(5), 2. https://doi.org/10.15394/ijaaa.2019.1404

Mehta, R., Winter, S. R., Rice, S., & Edwards, M. (2021). Are passengers willing to ride on autonomous cruise-ships? *Maritime Transport Research*, *2*. https://doi.org/10.1016/j.martra.2021.100014

Merriam-Webster. (n.d.). Risk. In *Merriam-Webster.com dictionary*. Retrieved June 16, 2023. https://www.merriam-webster.com/dictionary/risk

Merriam-Webster. (n.d.). Willing. In *Merriam-Webster.com dictionary*. Retrieved June 16, 2023. https://www.merriam-webster.com/dictionary/willing

Merritt, S. M., & Ilgen, D. R. (2008). Not all trust is created equal: Dispositional and history-based trust in human-automation interactions. *Human Factors*, *50*(2), 194–210. https://doi.org/10.1518/001872008X288574

Miller, J. D. (1987). The Challenger accident and public opinion: Attitudes towards the space program in the USA. *Space Policy*, *3*(2), 122–140. https://doi.org/10.1016/0265-9646(87)90009-9

Milner, M. N., Rice, S., Winter, S. R., & Crouse, S. R. (2021). What type of person would prefer driverless cars over commercial flight? *The Collegiate Aviation Review International*, *39*(1). https://ojs.library.okstate.edu/osu/index.php/CARI/article/view/8212

Mohon, L. (2018, January 19). *Story of Explorer 1*. National Aeronautics and Space Administration. https://www.nasa.gov/centers/marshall/history/explorer1/explorer-1.html

Morning Consult. (2021). National Tracking Poll #210264 – February 12-15, 2021. https://assets.morningconsult.com/wp-uploads/2021/02/24152659/210264_crosstabs_MC_TECH_SPACE_Adults_v1_AUTO.pdf

Muir, B. M. (1987). Trust between humans and machines, and the design of decision aids. *International Journal of Man-Machine Studies*, *27*(5), 527–539. https://doi.org/10.1016/S0020-7373(87)80013-5

Nadeau, F. (2013). Explaining public support for space exploration funding in America: A multivariate analysis. *Acta Astronautica*, *86*, 158–166. https://doi.org/10.1016/j.actaastro.2013.01.004

Nagle, T. T., & Müller, G. (2017). *The strategy and tactics of pricing: A guide to growing more profitably*. Routledge. https://doi.org/10.4324/9781315185309

National Aeronautics and Space Administration. (n.d.). *Artemis*. https://www.nasa.gov/specials/artemis/

National Aeronautics and Space Administration. (2020, September). *NASA's lunar exploration program overview*. https://www.nasa.gov/sites/default/files/atoms/files/artemis_plan-20200921.pdf

Nuyen, S. (2019, July 16). *Apollo 11 moon landing remains one of the most watched TV moments*. https://www.wusa9.com/article/news/apollo-11-moon-landing-fifa-world-cup-and-more-most-watched-television-events-in-history/507-84a186d0-4330-41a5-9a4b-c2134d6fa3e2

O'Brien, M. (2022, September 2). *Years late and billions over budget, NASA's most powerful rocket finally set for takeoff*. PBS. https://www.pbs.org/newshour/show/years-late-and-billions-over-budget-nasas-most-powerful-rocket-finally-set-for-takeoff

Panksepp, J. (2007). Neuroevolutionary sources of laughter and social joy: Modeling primal human laughter in laboratory rats. *Behavioural Brain Research*, *182*(2), 231–244. https://doi.org/10.1016/j.bbr.2007.02.015

Paolacci, G., & Chandler, J. (2014). Inside the Turk: Understanding Mechanical Turk as a participant pool. *Current Directions in Psychological Science*, *23*(3), 184–188. https://doi.org/10.1177/0963721414531598

Pateman, C. (1970). *Participation and democratic theory*. Cambridge University Press.

Powell, C. S. (2019, May 15). *Jeff Bezos foresees a trillion people living in millions of space colonies. Here's what he's doing to get the ball rolling*. NBC News. https://www.nbcnews.com/mach/science/jeff-bezos-foresees-trillion-people-living-millions-space-colonies-here-ncna1006036

Powell, M., & Ansic, D. (1997). Gender differences in risk behavior in financial decision-making: An experimental analysis. *Journal Of Economic Psychology*, *18*(6), 605–628. https://doi.org/10.1016/S0167-4870(97)00026-3

Pratt, J. M., & Yezierski, E. J. (2018). A novel qualitative method to improve access, elicitation, and sample diversification for enhanced transferability applied to studying chemistry outreach. *Chemistry Education Research and Practice*, *19*(2), 410–430. https://doi.org/10.1039/C7RP00200A

Ragbir, N. K., Rice, S., Winter, S. R., & Choy, E. C. (2021). Emotions and caring mediate the relationship between knowledge of sustainability and willingness to pay for greener aviation. *Technology in Society*, *64*, 101491. https://doi.org/10.1016/j.techsoc.2020.101491

Raghunathan, R., & Pham, M. T. (1999). All negative moods are not equal: Motivational influences of anxiety and sadness on decision making. *Organizational Behavior and Human Decision Processes*, *79*(1), 56–77. https://doi.org/10.1006/obhd.1999.2838

Rains, T., Winter, S. R., Rice, S., Milner, M. N., Bledsaw, Z., & Anania, E. C. (2017). Biofuel and commercial aviation: Will consumers pay more for it? *International Journal of Sustainable Aviation*, *3*(3), 217–232. https://doi.org/10.1504/IJSA.2017.086846

Roper Center Data. (2015, March 10). *Fly me to the Moon - The public and NASA*. Roper Center, Cornell University. https://ropercenter.cornell.edu/fly-me-moon-public-and-nasa

Rice, S., Mehta, R., Dunbar, V., Oyman, K., Ghosal, S., Oni, M. D., & Oni, M. A. (2015, January 15-18). *A valid and reliable scale for consumer willingness to fly* [Conference session]. 2015 Aviation, Aeronautics, and Aerospace International Research Conference, Phoenix, AZ, United States.

Rice, S. & Winter, S. R. (2015). *A quick effect scale: Providing evidence for validity and reliability* [Conference session]. 10th International Conference on Interdisciplinary Social Sciences, Split, Croatia.

Rice, S., & Winter, S. R. (2015b). Which passenger emotions mediate the relationship between type of pilot configuration and willingness to fly in commercial aviation? *Aviation Psychology and Applied Human Factors*, *5*(2), 83–92. https://doi.org/10.1027/2192-0923/a000081

Rice, S., & Winter, S. R. (2019). Do gender and age affect willingness to ride in driverless vehicles: If so, then why? *Technology in Society*, *58*. https://doi.org/10.1016/j.techsoc.2019.101145

Rice, S., Winter, S. R., Capps, J., Trombley, J., Robbins, J. Milner, M., & Lamb, T. (2020). Creation of two valid scales: Willingness to fly in an aircraft and willingness to pilot an aircraft. *International Journal of Aviation, Aeronautics, and Aerospace, 7*(1). https://doi.org/10.15394/ijaaa.2020.1440

Rice, S., Winter, S. R., Doherty, S., & Milner, M. (2017). Advantages and disadvantages of using internet-based survey methods in aviation-related research. *Journal of Aviation Technology and Engineering*, *7*(1), 5. https://doi.org/10.7771/2159-6670.1160

Rice, S., Winter, S. R., Kraemer, K., Mehta, R., & Oyman, K. (2015). how do depression medications taken by pilots affect passengers' willingness to fly. Rev. Eur. Stud., 7, 200. https://doi.org/10.5539/res.v7n11p200

Rice, S., Winter, S. R., Mehta, R., & Ragbir, N. K. (2019). What factors predict the type of person who is willing to fly in an autonomous commercial airplane? *Journal of Air Transport Management*, *75*, 131–138. https://doi.org/10.1016/j.jairtraman.2018.12.008

Rice University. (n.d.). *We choose to go to the Moon*. Rice University. https://www.rice.edu/jfk-speech

Riley, V. (1989). A general model of mixed-initiative human-machine systems. *Proceedings of the Human Factors Society Annual Meeting*, *33*(2), 124–128. https://doi.org/10.1177/154193128903300227

Roberts, N., Thatcher, J. B., & Grover, V. (2010). Advancing operations management theory using exploratory structural equation modelling techniques. *International Journal of Production Research*, *48*(15), 4329–4353. https://doi.org/10.1080/00207540902991682

Rönkkö, M., & Cho, E. (2022). An Updated Guideline for Assessing Discriminant Validity. *Organizational Research Methods*, *25*(1), 6–14. https://doi.org/10.1177/1094428120968614

Rosli, M. S., Saleh, N. S., Alshammari, S. H., Ibrahim, M. M., Atan, A. S., & Atan, N. A. (2021). Improving questionnaire reliability using construct reliability for researches in educational technology. *International Journal of Interactive Mobile Technologies*, *15*(4), 109–116. https://doi.org/10.3991/ijim.v15i04.20199

Sabherwal, A., Ballew, M. T., Linden, S., Gustafson, A., Goldberg, M. H., Maibach, E. W., Kotcher, J. E., Swim, J. K., Rosenthal, S. A., & Leiserowitz, A. (2021). The Greta Thunberg Effect: Familiarity with Greta Thunberg predicts intentions to engage in climate activism in the United States. *Journal of Applied Social Psychology*, *51*(4), 321–333. https://doi.org/10.1111/jasp.12737

Schubert, R., Brown, M., Gysler, M., & Brachinger, H. W. (1999). Financial decision-making: Are women really more risk-averse? *The American Economic Review*, *89*(2), 381–385. https://doi.org/10.1257/aer.89.2.381

Selk, A. (2017, June 22). Stephen Hawking, Kris Jenner and other famous people with plans to send humans to Mars. *The Washington Post*. https://www.washingtonpost.com/news/speaking-of-science/wp/2017/06/22/from-stephen-hawking-to-kris-jenner-a-list-of-famous-people-who-want-to-send-humans-to-mars/

Serdar, C. C., Cihan, M., Yücel, D., & Serdar, M. A. (2021). Sample size, power and effect size revisited: Simplified and practical approaches in pre-clinical, clinical and laboratory studies. *Biochemia Medica: Casopis Hrvatskoga Drustva Medicinskih Biokemicara / HDMB*, *31*(1). https://doi.org/10.11613/BM.2021.010502

Sharifian, N. (2017). *Tuned emotions: How age, intrinsic motivation, and time perspective impact the selection and effectiveness of emotion regulation* [Doctoral dissertation, North Carolina State University]. NC State Repository. https://repository.lib.ncsu.edu/bitstream/handle/1840.20/34662/etd.pdf?sequence=1

Shrider, E.A., Kollar, M., Chen, F., & Semga, J. (2021, September 14). *Income and poverty in the United States: 2020*. U.S. Department of Commerce.https://www.census.gov/content/dam/Census/library/publications/2021/demo/p60-273.pdf

Sobieraj, S., & Krämer, N. C. (2020). Similarities and differences between genders in the usage of computer with different levels of technological complexity. *Computers in Human Behavior*, *104*. https://doi.org/10.1016/j.chb.2019.09.021

Soper, D. (2022). *A-priori sample size calculator for structural equation models*. https://www.danielsoper.com/statcalc/calculator.aspx?id=89

Statista Research Department (2023, Feb 3). *NASA: familiarity levels in U.S. 2019*. Statista. https://www.statista.com/statistics/1027235/nasa-familiarity-united-states/

Steinberg, L. (2008). A social neuroscience perspective on adolescent risk-taking. *Developmental Review*, *28*(1), 78–106. https://doi.org/10.1016/j.dr.2007.08.002

St. Jude Children's Research Hospital. (2022). *Inspiration4*. https://www.stjude.org/get-involved/other-ways/inspiration4.html

Suresh, K., & Chandrashekara, S. (2012). Sample size estimation and power analysis for clinical research studies. *Journal of Human Reproductive Sciences*, *5*(1), 7–13. https://doi.org/10.4103/0974-1208.97779

Talinn, L. (2010, August 16). *Exploding the myth of popular support for Project Apollo*. Roger Launius's Blog. https://launiusr.wordpress.com/2010/08/16/exploding-the-myth-of-popular-support-for-project-apollo/

Train, R. (2022, August 29). *How much is NASA's Artemis lunar mission costing the US taxpayer?* Diario AS. https://en.as.com/latest_news/how-much-is-nasas-artemis-lunar-mission-costing-the-us-taxpayer-n/

USA Spending. (2022, December 30). *National Aeronautics and Space Administration (NASA)*. https://www.usaspending.gov/agency/national-aeronautics-and-space-administration?fy=2023

U.S. Census Bureau. (2020). *Census data table*. U.S. Department of Commerce. https://data.census.gov/table/

U.S. Department of the Treasury. (n.d.). Economic impact payments. https://home.treasury.gov/policy-issues/coronavirus/assistance-for-american-families-and-workers/economic-impact-payments

van de Walle, S., Bouckaert, G., & Maddens, B. (2004). *Perceptions of administrative performance: The key to trust in government?* KU Leuven.https://lirias.kuleuven.be/1861317?limo=0

Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User acceptance of information technology: Toward a unified view. *The Mississippi Quarterly*, *27*(3), 425–478. https://doi.org/10.2307/30036540

Vigoda, E. (2002). Administrative agents of democracy? A structural equation modeling of the relationship between public-sector performance and citizenship involvement. *Journal of Public Administration Research and Theory*, *12*(2), 241–272. https://doi.org/10.1093/oxfordjournals.jpart.a003531

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

Walters, N. W., Rice, S., Winter, S. R., Baugh, B. S., Ragbir, N. K., Anania, E. C., Capps, J., & Milner, M. N. (2018). Consumer willingness to pay for new airports that use renewable resources. *International Journal of Sustainable Aviation*, *4*(2), 79–98. https://doi.org/10.1504/IJSA.2018.094227

Wang, J.R. (2017, December 11). *New space policy directive calls for human expansion across solar system*. National Aeronautics and Space Administration. https://www.nasa.gov/press-release/new-space-policy-directive-calls-for-human-expansion-across-solar-system

Watson, D., Clark, L. A., & Tellegen, A. (n.d.). Development and validation of brief measures of positive and negative affect: The PANAS scales. *Journal of Personality and Social Psychology*, *54*(6), 1063–1070. https://doi.org/10.1037/0022-3514.54.6.1063

Westland, C.J. (2010). Lower bounds on sample size in structural equation modeling. *Electronic Commerce Research and Applications*, *9*(6), 476–487. https://doi.org/10.1016/j.elerap.2010.07.003

Wickens, C. D., Helton, W. S., Hollands, J. G., & Banbury, S. (2021). *Engineering psychology and human performance*. Routledge.

Wiggins, M. W., & Stevens, C. (2016). *Aviation social science: Research methods in practice*. Routledge. https://www.taylorfrancis.com/books/mono/10.4324/9781315261829/aviation-social-science-research-methods-practice-catherine-stevens-mark-wiggins

Williams, J.R. (2004, December 30). *The Gemini Program (1962 – 1966).* National Aeronautics and Space Administration. https://nssdc.gsfc.nasa.gov/planetary/gemini.html

Wilson, J. H., & Joye, S. W. (2016). *Research methods and statistics: An integrated approach*. SAGE Publications.

Winter, S. R., Carryl, J., & Rice, S. (2015). Controlled Rest in Position (CRIP): Consumer perceptions in the United States. *Collegiate Aviation Review*, *33*(1), 14. https://doi.org/10.22488/okstate.18.100461

Winter, S. R., Crouse, S. R., & Rice, S. (2021). The development of "green" airports: Which factors influence willingness to pay for sustainability and intention to act? A structural and mediation model analysis. *Technology in Society*, *65*. https://doi.org/10.1016/j.techsoc.2021.101576

Winter, S. R., Keebler, J. R., Rice, S., Mehta, R., & Baugh, B. S. (2018). Patient perceptions on the use of driverless ambulances: An affective perspective. *Transportation Research. Part F, Traffic Psychology and Behaviour*, *58*, 431–441. https://doi.org/10.1016/j.trf.2018.06.033

Winter, S. R., & Rice, S. (2015). Pilots who are perceived as unsociable are perceived as more likely to have a mental illness. *Aviation Psychology and Applied Human Factors*, *5*(1), 36–44. https://doi.org/10.1027/2192-0923/a000071

Winter, S. R., Rice, S., & Lamb, T. L. (2020). A prediction model of consumer's willingness to fly in autonomous air taxis. *Journal of Air Transport Management*, *89*. https://doi.org/10.1016/j.jairtraman.2020.101926

Winter, S. R., Rice, S., Rains, T., Milner, M., & Mehta, R. (2017). A longitudinal study on the alteration of consumer perceptions and the use of pilot medication. *Journal of Air Transport Management*, *59*, 100–106. https://doi.org/10.1016/j.jairtraman.2016.12.004

Winter, S. R., Thropp, J. E., & Rice, S. (2019). What factors predict a consumer's support of environmental sustainability in aviation? A multi-model analysis. *International Journal of Sustainable Aviation*, *5*(3), 190–204. https://doi.org/10.1504/IJSA.2019.103502

Winter, S. R., & Trombley, J. (2019). A prediction model for the type of consumer willing to travel to and live on Mars. *International Journal of Aviation Research*, *11*(1). https://ojs.library.okstate.edu/osu/index.php/IJAR/article/view/7922

Zajonc, R. B. (2001). Mere exposure: A gateway to the subliminal. *Current Directions in Psychological Science*, *10*(6), 224–228. https://doi.org/10.1111/1467-8721.00154

Zeithaml, V. A. (1988). Consumer perceptions of price, quality, and value: A means-end model and synthesis of evidence. *Journal of Marketing*, *52*(3), 2–22. https://doi.org/10.1177/002224298805200302

Zhang, D. C., Highhouse, S., & Nye, C. D. (2018). Development and validation of the general risk propensity scale (GRiPS). *Journal of Behavioral Decision Making*, *32*(2), 152–167. https://doi.org/10.1002/bdm.2102

Appendix A

Permission to Conduct Research

The IRB approval can be seen in the embedded file.

24-010 Crouse
Artemis Mission IRB

Appendix B

Data Collection Device

The data collection device can be seen in the embedded file.

Crouse__Instrument
.pdf

Appendix C

Scales for the Current Study

This Appendix contains the scales used in the current study.

Trust in Government
Grimmelikhuijsen, S., & Knies, E. (2015). Validating a scale for citizen trust in government organizations. *International Review of Administrative Sciences, 83*(3), 583–601. https://doi.org/10.1177/0020852315585950
Score: 1-5 Strongly Disagree to Strongly Agree
Competence

1. When it concerns Space Exploration, the government is capable.
2. When it concerns Space Exploration, the government is expert.
3. When it concerns Space Exploration, the government carries out its duty very well.

Benevolence

1. When it concerns Space Exploration, if citizens need help, the government will do its best to help them.
2. When it concerns Space Exploration, the government acts in the interest of citizens.
3. When it concerns Space Exploration, the government is genuinely interested in the well-being of citizens.

Integrity

1. When it concerns Space Exploration, the government approaches citizens in a sincere way.
2. When it concerns Space Exploration, the government is sincere.
3. When it concerns Space Exploration, the government is honest.

General Affect
Rice, S. & Winter, S. R. (2015). *A quick effect scale: Providing evidence for validity and reliability*. 10th International Conference on Interdisciplinary Social Sciences, Split, Croatia.
Score: 1-5 Strongly Disagree to Strongly Agree

1. I feel good about this.
2. I feel positive about this.
3. I feel favorable about this.
4. I feel cheerful about this.
5. I feel happy about this.
6. I feel enthusiastic about this.
7. I feel delighted about this.

Future Time Perspective

Carstensen, L. L., & Lang, F. R. (1996). *Future time perspective scale* [Unpublished manuscript]. Stanford University.

Score: 1 – 7 Very Untrue to Very True

1. Many opportunities await me in the future.
2. I expect that I will set many new goals in the future.
3. My future is filled with possibilities.
4. Most of my life lies ahead of me.
5. My future seems infinite to me.
6. I could do anything I want in the future.
7. There is plenty of time left in my life to make new plans.
8. I have the sense time is running out.
9. There are only limited possibilities in my future.
10. As I get older, I begin to experience time as limited.

Familiarity with Artemis

Rice, S., Winter, S. R., Mehta, R., & Ragbir, N. K. (2019). What factors predict the type of person who is willing to fly in an autonomous commercial airplane? *Journal of Air Transport Management*, *75*, 131–138. https://doi.org/10.1016/j.jairtraman.2018.12.008

Score: 1-5 Strongly Disagree to Strongly Agree

1. I am familiar with NASA's Artemis Mission.
2. I have a lot of knowledge about NASA's Artemis Mission.
3. I have read a lot about NASA's Artemis Mission.
4. NASA's Artemis Mission has been of interest to me for a while now.
5. I know more about NASA's Artemis Mission than the average person.

Attitude Towards Space Exploration

Entradas, M., Miller, S., & Peters, H. P. (2013). Preaching to the converted? An analysis of the UK public for space exploration. *Public Understanding of Science*, *22*(3), 269–286. https://doi.org/10.1177/0963662511411255

Score: 1-5 Strongly Disagree to Strongly Agree

1. Space exploration is very risky.
2. It is important that the U.S. is at the forefront of space activity.
3. Space exploration is good value for money.
4. Space exploration is much less important than solving problems on Earth.

Perceived Value

Zeithaml, V. A. (1988). Consumer perceptions of price, quality, and value: A means-end model and synthesis of evidence. *Journal of Marketing*, *52*(3), 2–22. https://doi.org/10.1177/002224298805200302

Score: 1-5 Strongly Disagree to Strongly Agree

1. NASA's Artemis Mission is something that would be beneficial to me.
2. NASA's Artemis Mission would be something valuable for me.
3. I think NASA's Artemis Mission is useful.
4. There would be value in NASA's Artemis Mission.
5. If NASA's Artemis Mission were available, I think it would be beneficial to me.

Wariness of New Technology

Rice, S., Winter, S. R., Mehta, R., & Ragbir, N. K. (2019). What factors predict the type of person who is willing to fly in an autonomous commercial airplane? *Journal of Air Transport Management*, *75*, 131–138. https://doi.org/10.1016/j.jairtraman.2018.12.008

Score: 1-5 Strongly Disagree to Strongly Agree

1. In general, I am wary of new technology.
2. New technology scares me.
3. New technology is not as safe as it should be.
4. tend to fear new technology until it is proven to be safe.
5. New technology is likely to be dangerous.

Complexity Perception Scale

Rice, S., Winter, S. R., Mehta, R., & Ragbir, N. K. (2019). What factors predict the type of person who is willing to fly in an autonomous commercial airplane? *Journal of Air Transport Management*, *75*, 131–138. https://doi.org/10.1016/j.jairtraman.2018.12.008

Score: 1-5 Strongly Disagree to Strongly Agree

1. The technology behind NASA’s Artemis Mission is very complex.
2. I do not understand the technology behind NASA’s Artemis Mission.
3. It is difficult to know how the technology that controls NASA’s Artemis Mission works.
4. I have no idea what the technology that controls NASA’s Artemis Mission is doing.
5. It is a mystery to me how the technology that controls NASA’s Artemis Mission operates.

General Risk Propensity Scale

Zhang, D. C., Highhouse, S., & Nye, C. D. (2018). Development and validation of the general risk propensity scale (GRiPS). *Journal of Behavioral Decision Making*, *32*(2), 152–167. https://doi.org/10.1002/bdm.2102

Score: 1-5 Strongly Disagree to Strongly Agree

1. Taking risks makes life more fun.
2. My friends would say that I am a risk take.
3. I enjoy taking risks in most aspects of my life.
4. I would take a risk even if it meant I might get hurt.
5. Taking risks is an important part of my life.
6. I commonly make risky decisions.
7. I am a believer of taking chances.
8. I am attracted, rather than scared by risk.

Fun Factor Scale

Rice, S., Winter, S. R., Mehta, R., & Ragbir, N. K. (2019). What factors predict the type of person who is willing to fly in an autonomous commercial airplane? *Journal of Air Transport Management*, *75*, 131–138. https://doi.org/10.1016/j.jairtraman.2018.12.008

Score: 1-5 Strongly Disagree to Strongly Agree

1. I like the idea of NASA’s Artemis Mission.

2. I think NASA's Artemis Mission will be fun.
3. I am interested in NASA's Artemis Mission.
4. I think NASA's Artemis Mission is cool.
5. I've always wanted NASA's Artemis Mission.

Willingness to Support

Winter, S. R., Thropp, J. E., & Rice, S. (2019). What factors predict a consumer's support of environmental sustainability in aviation? A multi-model analysis. *International Journal of Sustainable Aviation, 5*(3), 190–204. https://doi.org/10.1504/IJSA.2019.103502

Score: 1-5 Strongly Disagree to Strongly Agree

1. I would be willing to support NASA's Artemis Mission.
2. I would be comfortable supporting NASA's Artemis Mission.
3. I would have no problem supporting NASA's Artemis Mission.
4. I would be happy to support NASA's Artemis Mission.
5. I would feel safe supporting NASA's Artemis Mission.
6. I have no fear of supporting NASA's Artemis Mission.
7. I feel confident supporting NASA's Artemis Mission.