THE ADOPTION OF VIRTUAL REALITY AS A SOCIAL INTERACTION TOOL:

INTEGRATING COVID-19 CONTEXT TO THE TECHNOLOGY ACCEPTANCE MODEL

A THESIS

SUBMITTED TO THE GRADUATE SCHOOL

IN PARTIAL FULFILLMENT OF THE REQUIREMENTS

FOR THE DEGREE

MASTER OF ARTS

BY

SI HYUN KIM

DR. KEVIN MOLONEY — ADVISOR

BALL STATE UNIVERSITY

MUNCIE, INDIANA

DECEMBER 2021

Acknowledgements

Thank you, Dr. Tim Huang, for guiding me and helping with this thesis until the end. Even in the

midst of the pandemic or transitioning you did not give up on me. I cannot thank you enough for

your patience and guidance.

Abstract

THESIS: The adoption of virtual reality as a social interaction tool: Integrating COVID-19 context to the technology acceptance model

STUDENT: Si Hyun Kim

DEGREE: Master of Arts

COLLEGE: Communication, Information and Media

DATE: December 2021

PAGES: 33

This thesis examines the impact of COVID-19 on peoples' acceptance of VR experiences. The research design is guided by the Technology Acceptance Model (TAM), a model applied to predict user attitudes and their likelihood to accept new technology. Based on prior literature, I aim to answer the following questions: (1) How does the users' perceived impact of the COVID-19 pandemic affect their attitude towards using VR and intention to adopt VR (even after the pandemic)? (2) In the context of COVID-19, what relationships do the variables in TAM (i.e., Perceived Ease of Use and Perceived Usefulness) have to the intention to use VR as a social interaction tool? (3) How do mental health consciousness and perceived social interaction mediate those relationships? An online survey was implemented to investigate the relationship between variables of TAM and the potential predictors, including mental health consciousness, perceived social interaction, perceived usefulness, and perceived ease of use. The results suggest the perceived impact of COVID-19 is a strong predictor for positive attitude toward and acceptance of VR experiences. Furthermore, users who are conscious of their mental health displayed positive attitudes towards VR experiences when they perceived social interaction.

Table of Contents

Chapter 1. Introduction

COVID-19 has introduced a new lifestyle for many. Mainly, social distancing policies and stay-at-home ordinances have disrupted people's professional, social, and personal lives. Furthermore, physical and social isolation have been practiced differently depending on the individual's perceived impact of the pandemic. Prolonged physical and social isolation have deprived people of social connections (Banerjee & Rai, 2020), and studies are already showing that social isolation has a positive correlation with negative mental health symptoms, like depression and anxiety (Killgore et al., 2020; Cullen et al., 2020).

Virtual reality (VR) has been applied as a tool in therapy settings to treat anxiety (Srivastava & Das, 2015), and VR usage in mental health and social interaction could potentially offer a buffer during this time of caution. Social VR applications are readily available for users to meet other users in a completely virtual environment. However, VR is still considered a novel technology, and many users are reluctant to use VR because of perceptions that it is complicated or difficult to use. Others may be completely unaware of VR's capabilities.

Assuming these challenges, researchers have extended the Technology Acceptance Model (TAM) on VR to study factors contributing to consumer acceptance of VR (Manis & Choi, 2018). For example, Manis and Choi suggest that people are more likely to adopt VR if it is enjoyable and/or useful depending on the context and purpose. In another study, Lee et al. (2019) found that social interaction is also an important factor for users deciding to adopt VR. Therefore, if people consider using VR an enjoyable experience and also see its potential for social interaction, they are more likely to adopt it.

Purpose of Study

Based on prior research, this study aims to examine how the perceived impact of COVID-19 affects users' attitudes toward VR and their intention to use it as a social interaction tool. This study analyzed which extended variables of TAM, including mental health consciousness, perceived social interaction, perceived usefulness (PU), and perceived ease of use (PEU), are important when designing VR experience in the midst of the COVID-19 pandemic. To better understand the impact of these variables, I proposed the following questions: (1) How does the users' perceived impact of the COVID-19 pandemic affect their attitude towards using VR and intention to adopt VR as a social interaction tool (even after the pandemic)? (2) In the context of COVID-19, what relationships do PU & PEU have with the intention to use VR as a social interaction tool, and (3) how do mental health consciousness and perceived social interaction mediate those relationships?

The findings will add the unique contextual variable of the COVID-19 pandemic to the existing theoretical framework, Technology Acceptance Model. A previous study by Lee et al. (2019) showed that people were more willing to accept VR as a social interaction tool if it was perceived as more enjoyable than useful; however, the COVID-19 context may impact this result because people may perceive social interaction as a necessity to enhance mental health. Results from this study will inform VR developers of variables that have significant relationships with the intention to use VR as a social interaction and support tool. Consequently, developers will be able to discern better ways to persuade health-conscious users to adopt VR. If this study can show that people are more likely to accept VR as a social support tool to enhance one's mental health, VR companies could saturate the market with tools and software for such purposes, thereby making VR a more easily accessible tool.

Chapter 2. Literature Review

2.1. COVID-19 Impact: Social Isolation and Loneliness

COVID-19 has changed many aspects of the world and the individual. People have had to make changes to their everyday lifestyle–both big and small–due to the disruption of normal life caused by the fast-spreading pandemic. With the emergence of COVID-19, most living in the United States have been advised to stay at home, work from home if possible, avoid social gatherings, and maintain a physical distance of at least 6ft from others. Even more, severe social isolation and quarantine restrictions are required when an individual has potentially come into contact with the virus, being advised to self-isolate for two weeks.

Researchers found that the perceived impact of COVID-19 on people's daily life includes health anxiety, financial worry, loneliness, and lack of social support (Tull et al., 2020). While robust social restrictions are necessary to prevent the spread of COVID-19, elements like social distancing have been interpreted as social disconnection. A nationwide survey study by Kilgore et al. (2020) evaluating loneliness felt by adults found that a significant majority felt "socially isolated much of the time (p. 2)." This study also reported that lonely individuals were significantly more depressed than non-lonely, with 54.7% of the lonely participants meeting the significant criteria for moderate to severe depression compared to 15.3% of the non-lonely participants.

Another study by Panchal et al. (2021) reported that 41% of adults reported experiencing symptoms of anxiety and/or depressive disorder in January 2021. Furthermore, a survey in June 2020 showed that 13% of adults reported new or increased use of substances, while 11% of adults reported having suicidal ideation in the past 30 days due to the COVID-19 pandemic. Although the study does not constitute a causal relationship between stay-at-home efforts and severe loneliness, these findings are consistent with the hypothesis that prolonged social isolation

enacted during the COVID-19 pandemic can increase feelings of loneliness—a key contributor

to mental health problems like depression and suicide. A systematic review by Leigh-Hunt et al.

(2017) suggests that there is strong evidence for social isolation and loneliness being associated

with poor mental health as well as physical health.

Loneliness refers to subjective feelings, while social isolation describes the level and

frequency of one's social interactions. Loneliness is associated with several mental health and

physical health repercussions (Cullen et al., 2020). According to a study by Saltzmann (2020),

loneliness can cause increased depressive symptoms, poor self-rated health, impaired functional

status, vision deficits, and a perceived negative change in the quality of one's life. Social

isolation has also been associated with unhealthy lifestyle choices aimed at reducing stress,

including smoking, alcohol consumption, lower physical activity, poor dietary choices, and

noncompliance with medical prescriptions. Besides loneliness, health anxiety, and lack of social

support, stay-at-home orders also led to financial worry during the pandemic (Tull et al., 2020).

2.2. The adoption of virtual reality devices: A technology acceptance model perspective

Virtual reality (VR) has become a complicated term, as it is often associated with several

definitions (Manis & Choi, 2018). Initially, VR was defined by the hardware that allowed people

to experience VR. Steuer (1992) formulated a definition of VR without referring to the hardware

itself: "a real or simulated environment in which a perceiver experiences telepresence (p. 7),"

which is using communication medium to create the sense of presence in an environment.

However, other scholars have attempted to draw even more of a distinction between hardware

and the content or experience associated with VR, as Steuer's definition still referenced the use

of some communication device. Later, Brooks (1999) defined VR as an encounter in which "the

user is effectively immersed in a responsive virtual world (p. 16), and in 2017, Berg and Vance

(2017) provided an updated definition of VR as an immersive computing technology (ICT) that incorporates a "set of technologies that enable people to immersively experience a world beyond reality (p. 2)."

With the variety of definitions in the field, Manis & Choi (2018) distinguish between virtual reality experience, virtual experience content, and virtual reality hardware/devices, making sure that these terms do not become synonymous terms of virtual reality. Manis & Choi define the following terms: (1) virtual reality content as "an environment simulating a sense of presence in the real world or an imagined world," (2) virtual reality hardware as "equipment (i.e. ICT) allowing the user to interact within, view, and experience virtual reality content," and (3) virtual reality experience as "an encounter in which the user is effectively immersed in virtual reality content by means of virtual reality hardware (p. 2)."

The majority of VR research focuses on VR content, as wearable technology is becoming more prevalent and popular through industry attempts to make consumer experience with VR technology more seamless and practical. VR research has shown that virtual reality establishes presence (Riva et al., 2007) and connection between users (Cummings & Bailenson, 2016). The mediated experience helps facilitate the feeling of coexistence and togetherness, allowing users to immerse themselves in the experience-increasing enjoyment.

2.2.1. TAM Original Model and Extended TAM Models

The original TAM model proposed that perceived usefulness (PU) and perceived ease of use (PEU) of a particular technology influence an individual's behavioral intention, attitude, and behavior towards the technology (Daft & Lengel, 1986). Consequently, these two variables can also predict user acceptance of new technology. PU is defined as "the degree to which a person believes that using a particular system would enhance his or her job performance (Davis, 1989,

p. 320)," while PEU is defined as "the degree to which a person believes that using a particular

system would be free of effort (Davis, 1989, p. 320)." These two variables are deemed important

because users tend to decide whether or not to use an application based upon the extent that they

believe the application will help them perform better. Still, even if users believe that the

application enhances performance, they may be deterred from using an application if the

difficulty of use outweighs the performance benefits (Davis, 1989). In VR experience research,

both PU and PEU have been strong predictors of acceptance (Oliveira, 2020).

Attitude, intention to use, and intention to purchase are acceptance TAM variables,

generally the dependent variables in many versions of TAM referring to the users' intentions and

motivations to adopt new technology (Lai, 2017). Based on both the original TAM framework

and new studies on TAM, the first two hypotheses were proposed as followed:

H1: Perceived Ease of Use is a predictor of (a) Attitude Towards Virtual Reality Experience as a

Social Interaction Tool, (b) Intention to Use Virtual Reality Experience as a Social Interaction

Tool, and (c) Intention to Purchase Virtual Reality Experiences as a Social Interaction Tool.

H2: Perceived Usefulness are predictors of (a) Attitude Towards Virtual Reality Experience as a

Social Interaction Tool, (b) Intention to Use Virtual Reality Experience as a Social Interaction

Tool, and (c) Intention to Purchase Virtual Reality Experiences as a Social Interaction Tool.

2.2.2. Perceived impact of COVID-19, Mental Health Consciousness, and Technology

Acceptance

Although there is a lack of research on adoption behavior influenced by the impact of

COVID-19, a recent study by Huang et al. (in press) showed that people who reported that

COVID-19 largely impacted their lives were more likely to report higher levels of perceived ease

of use and usefulness of VR. Huang further explains that there could be many possible explanations to the correlation between perceived COVID-19 impact and perceived ease of use and usefulness of VR, including mental health. The effects of social isolation could impact people's consciousness towards their mental health. Therefore, the third hypothesis was proposed as followed:

H3: The Impact of COVID-19 is a predictor of (a) Mental Health Consciousness and (b) Perceived Social Interaction.

Past research has shown that the perceived usefulness of technology increased when mediated by health consciousness. Specifically, the study by Ahadzadeh et al. (2015) showed that people who were more conscious about their health used the internet for health-related purposes, showing that health-conscious people engage in health-supplementing behaviors. Therefore, people who are conscious of the impact of COVID-19 on their mental health could be more likely to adopt VR as a social interaction tool:

H4: Mental Health Consciousness is a predictor of (a) Perceived social interaction, (b) Perceived Ease of Use, and (c) Perceived Usefulness.

2.2.3. Perceived Social Interaction and TAM

Lee et al (2019) extended the basic model by adding perceived social interaction as an external variable. Social interaction, in the context of interaction among users, is defined as the process of behaving and reacting with another (Choi & Kim, 2004). Social interaction has been established as an important factor in computer and mobile games, as well as other entertainment-related applications that increase users' enjoyment, because it plays a role in the storytelling that builds users' play experience. Lee et al.'s 2019 study on the adoption of virtual reality devices

showed that social interaction increases perceived enjoyment and concluded that social

interaction can be a key factor in increasing perceived enjoyment.

Perceived enjoyment is considered the most salient intrinsic motivator on behavioral intention to

use technology (El Shamy & Hassanein, 2017). The study by Lee et al. (2019) also identified

perceived enjoyment as a significant factor that affected perceived usefulness, perceived ease of

use, attitude towards using, and intention to use. Interestingly, the study showed that perceived

enjoyment influenced intention to use more than perceived usefulness, further emphasizing the

idea that perceived enjoyment should be considered as a significant factor when applying TAM

to the entertainment and social networking characteristics of virtual reality. However, the raised

mental health consciousness due to perceived COVID-19 impact could serve as another strong

intrinsic motivation for people to accept new technology. Table 1 demonstrates the proposed

research model.

H5: Perceived Social interaction on a VR Experience is the predictor of (a) Perceived Ease of

Use and (b) Perceived Usefulness.

Table 1: Research Model
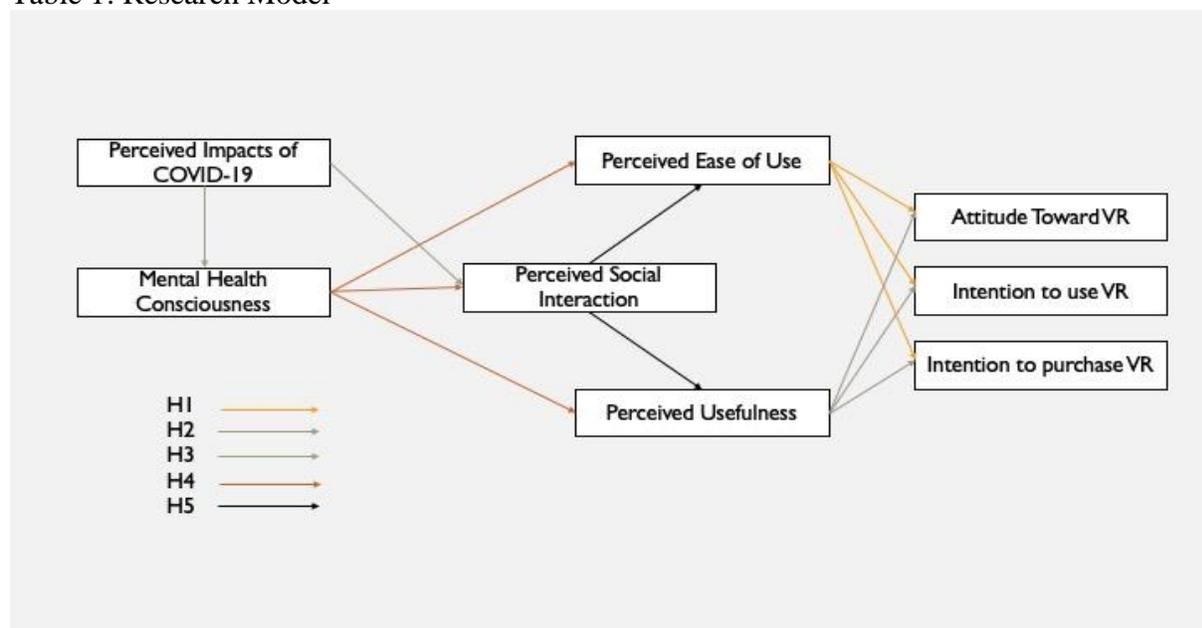
Chapter 3. Methodology

3.1. Research Design

The main goal of this study is to extend the Technology Acceptance Model (TAM) to the COVID-19 context by examining how the perceived impact of COVID-19 affects users' attitudes and intentions toward the use of VR as a social interaction tool. This study aims to test which TAM variables, including perceived usefulness and perceived ease of use, are important to a user's intention to adopt VR when designing a VR experience in the midst of the COVID-19 pandemic.

The hypotheses were tested through a survey study. The survey began with a prompt that asked participants to watch a 1:05 minute-long trailer for a VR social application embedded at the beginning of the survey (Appendix B). After the participants watched the video, they were taken to the questions portion about their reactions to the video including TAM questions. The latter part of the survey included COVID-19-related questions, perceived mental health questions, and demographic questions.

3.2. Participants

This study recruited 300 participants using Amazon Mechanical Turk (MTurk). MTurk provides a wider demographic than a college pool and can collect samples that are more representative of the US population (Miller et al., 2017). Participants received $1 as compensation after completing the survey.

3.3. VR application Trailer (Appendix C)

The 1:05-minutes trailer was the trailer of a VR application called vTime XR. The trailer featured footage from the actual application, and it displayed a first-person view of a user socializing with other users in a VR environment. The trailer demonstrated features that help

establish presence such as creation of one's avatar, virtual environments, 360 sound technology, and control of the avatar's hands and facial expressions.

3.4. Survey Instrument (Appendix A)

The survey is composed of questions measuring (1) technology acceptance model (TAM) variables, (2) COVID-19 impact, and (3) Personal Mental Health. Questions 1-9 asked participants questions about the technology acceptance model (TAM). The TAM portion was adopted from the survey model by Manis & Choi (2018) and Lee et al. (2019), which was a modification of the original TAM measure developed by Davis (1989) and Venkatesh et al. (2008). Specifically, the TAM portion measured individual variables including perceived usefulness, perceived ease of use, mental health consciousness, and perceived social interaction. It also measured dependent variables including the intention to use, intention to purchase, and attitude towards VR experiences.

The perceived impact of COVID-19 is another individual variable that was measured. Questions 11-16 asked participants how COVID-19 has affected their lives (Tull et al., 2020). The mental health questions (see questions 17-19) included a mental health consciousness portion, which is an external TAM variable that was placed in the mental health section for organization purposes. The last section of the survey asked about the participant's demographic information, including age, gender, and race/ethnicity (questions 20-24).

3.5. Analytic Tools

For this study, I will be reporting the descriptive analysis of the variables of interest. Second, a series of ordinary least squares (OLS) regressions were performed to test the hypotheses. All the data was analyzed using SPSS 27.

Chapter 4. Results

4.1. Descriptive Analysis

Out of 300 participants, 298 survey responses were calculated as part of the results, because two participants submitted incomplete surveys. Table 1 displays the demographic information of the study's participants. About 65% of the participants identified as male and 35% as female. About 52% of the participants identified as White and 37% as Asian.

Table 1. The demographic characteristics of the participants (N=298)

Variable	Categories	Number of Participants (%)
Sex	Male	193 (64.8%)
	Female	104 (34.9%)
	Non-binary/Third gender	1 (0.3%)
Age	18-74	
Household Income	Less than $10,000	20 (6.7%)
	$10,000-$19,999	35 (11.7%)
	$20,000-$29,999	35 (11.7%)
	$30,000-$39,999	24 (8.1%)
	$40,000-$49,999	44 (14.8%)
	$50,000-$59,999	35 (11.7%)
	$60,000-$69,999	16 (5.4%)
	$70,000-$79,999	21 (7.0%)
	$80,000-$89,999	33 (11.1%)
	$90,000-$99,999	23 (7.7%)
	$100,000-$149,999	11 (3.7%)
	More than $150,000	1 (0.3%)
Education Level	High school graduate	9 (3.0%)
	Some college	19 (6.4%)
	2-year degree	8 (2.7%)
	4-year degree	228 (76.5%)
	Professional degree	31 (10.4%)
	Doctorate	2 (0.7%)

Race/Ethnicity	White	154 (51.7%)
	Black/African American	26 (8.7%)
	American Indian or Alaska Native	3 (1.0%)
	Asian	109 (36.6%)
	Others	6 (2.0%)

Table 2 presents the descriptive analysis of the perceived impacts of COVID-19. For individual impacts, participants reported a high level of COVID-19 impacts across all four categories. Financial worry was rated the highest among all the perceived impacts, followed by loneliness, lack of social support, and health anxiety. Table 3 presents the descriptive analysis of participants' mental health consciousness and perceived social interaction—the two main predictors of the current study—participants reported an average of 6.64 and 5.61 points respectively on a scale from 1 (strongly disagree) to 7 (strongly agree) (see Table 3).

Table 2. Descriptive Analysis of Perceived Impacts of COVID-19

Construct (Cronbach's α)	Response Categories	Mean (Standard Deviation)
Perceived Impacts of COVID-19 (0.79)	1= None at all	**6.64 (2.14)**
	2	
Health Anxiety	3	6.26 (2.64)
	4	
Financial Worry	5	6.84 (2.62)
	6	
Lack of Social Support	7=An extreme amount	6.61 (2.67)
Loneliness		6.83 (2.77)

Table 3. Descriptive Analysis of External TAM variables

Construct (Numbers of Items; Cronbach's α)	Response Categories	Mean (Standard Deviation)
Mental Health Consciousness (8 items; 0.83) Example Item: I have the impression that I sacrifice a lot for my health.	From 1 to 7 1= Strongly disagree 7=Strongly agree	5.45 (0.92)
Perceived Social Interaction (3 items; 0.78) Example Item: I have the impression that I sacrifice a lot for my health.	From 1 to 7 1= Strongly disagree 7=Strongly agree	5.61 (1.06)

Table 4 presents the descriptive analysis of the TAM variables. For TAM-related variables, participants reported an average of 5.52 and 5.65 points on perceived usefulness and ease of use respectively on a scale from 1 (strongly disagree) to 7 (strongly agree). Furthermore, participants reported positive attitudes toward VR experience (5.69) and a strong intention to use (5.49) and purchase (6.23) VR experience on average.

Table 4. Descriptive Analysis of TAM variables

Construct (Numbers of Items; Cronbach's α)	Response Categories	Mean (Standard Deviation)
Perceived Usefulness (Usefulness) (4 items; 0.86) Example Item: Using virtual reality experience to socialize would be useful in my life.	From 1 to 7 1= Strongly disagree 7=Strongly agree	5.52 (1.04)
Perceived Ease of Use (Ease of Use) (5 items; 0.87) Example Item: I believe using virtual reality experience to socialize would be easy for me.	From 1 to 7 1= Strongly disagree 7=Strongly agree	5.65 (0.98)

Attitude Towards VR Experience (Attitude) (7 items; 0.90) Example Item: If I were actually using virtual reality experience to socialize, my experience would be "Good."	From 1 to 7 1= Strongly disagree 7=Strongly agree	5.69 (0.97)
Intention to Use (Use Intention) (7 items; 0.93) Example Item: There is a high likelihood that I will use virtual reality experience to socialize within the foreseeable future.	From 1 to 7 1= Strongly disagree 7=Strongly agree	5.49 (1.17)
Intention to Purchase (Purchase Intention) (4 items; 0.90) Example Item: There is a high likelihood that I will purchase virtual reality hardware within the foreseeable future.	From 1 to 7 1= Strongly disagree 7=Strongly agree	6.23 (1.27)

4.2. OLS Regressions

I performed a series of OLS regressions to test all the hypotheses. In the first set of the regressions (Table 5), I examined whether perceived ease of use (PEU) and perceived usefulness (PU) predicted the attitude towards VR experiences, intention to use VR experiences, and the intention to purchase VR devices (H1 &H2). The results suggested that PU is a significant predictor of attitude towards VR (β =.63, p < 0.001), intention to use VR experiences (β =.71, p < 0.001), and intention to purchase VR devices (β =.69, p < 0.001). Results also showed that PEU is a significant predictor of attitude towards VR (β =.31, p < 0.001), intention to use VR experiences (β =.26, p < 0.001), and intention to purchase VR devices (β =.18, p < 0.001). The results fully supported H1 and H2.

Table 5. OLS Regression Analysis of PU and PEU on Acceptance-Related TAM Variables

Dependent Variables	Attitude Towards VR	Intention to Use	Intention to Purchase

Sex (1=female, 0=male)	.006			.001		-.02	
Age	.007			-.01		0.00	
Education Level	-.006			.06		.08	
Household Income	.08	***		-.002		.001	
Perceived Ease of Use	.31	***		.26	***	.18	***
Perceived Usefulness	.63	***		.71	***	.69	***
F	237.26	***		305.9	***	128.81	***
Adjusted R^2	.83			.86		.72	

Note: N=298. *P<.05, **P<.01, ***P<.001

In my second set of regressions (Table 6), I examined whether or not the perceived COVID-19 impact predicted participants' perceived social interaction and mental health consciousness (H3). I included demographic variables (i.e. sex, age, race, educational level, and household income) as control variables. The results showed that perceived impact of COVID-19 is a significant predictor for both perceived social interaction (β =.43, p < 0.001) and mental health consciousness (β =.56, p < 0.001), indicating that COVID-19 is a significant external variable affecting the acceptance of VR technology. Therefore, the results supported H3.

Table 6. Perceived Impact of COVID-19 and Demographics on Mental Health Consciousness and Perceived Social Interaction.

Dependent Variables	**Mental Health Consciousness**	**Perceived Social Interaction**

Sex (1=female, 0=male)	.12		.08
Age	-.12		-.05
Education Level	.003		-.005
Household Income	.18	***	.13
Impact of COVID-19	.56	***	.43 ***
F	31.26	***	14.59 ***
Adjusted R^2	.34		.19

Note: N=298. *P<.05, **P<.01, ***P<.001

In my last set of regressions (Table 7), I tested whether mental health consciousness is a significant predictor for perceived social interaction (PSI), PU, and PEU (H4). I also tested whether PSI is a predictor for PU and PEU (H5). The results showed that mental health consciousness is a significant predictor for PSI (β =.73, p < 0.001), PEU (β =.21, p < 0.001), and PU (β =.22, p < 0.001). The results also showed that PSI is another significant predictor for PEU (β =.63, p < 0.001), and PU (β =.67, p < 0.001). The results supported the H4 and H5.

Table 7. OLS Regression Mental Health Consciousness and Perceived Social Interaction Regressed on PU and PEU.

Dependent Variables	Perceived Social Interaction	Perceived Usefulness	Perceived Ease of Use
Sex (1=female, 0=male)	-.006	-.02	.05
Age	.04	-.09	.03
Education Level	-.003	.26	-.07

Household Income	.006	***		-.01		-.01
Perceived Social Interaction				.67	***	.63 ***
Mental Health Consciousness	.73	***		.22	***	.21 ***
F	64.58	***		122.64	***	83.01 ***
Adjusted R^2	.52			.71		.62

Note: N=298. *P<.05, **P<.01, ***P<.001

Chapter 5. Discussion

5.1. Summary of findings

I proposed five hypotheses for this study, and all were supported by data. Previous studies (e.g., Huang et al., in press) suggest that people who perceive that COVID-19 had a large impact on their lives (health anxiety, financial worry, social support, loneliness) were more likely to report a higher level of VR adoption using the technology acceptance model (TAM), including perceived usefulness (PU), perceived ease of use (PEU), attitude toward VR experience, and intention to use and purchase VR experiences. My thesis further explores the roles of mental health consciousness and perceived social interaction in the relationship between the perceived impacts of COVID-19 and TAM variables.

My findings further suggest that a high level of perceived COVID-19 impact is also a strong predictor for high levels of mental health consciousness and perceived social interaction (H3), and, in turn, high levels of mental health consciousness and perceived social interaction are significant predictors of PU, PEU (H4 & H5). Finally, PU and PEU predict participant's attitude towards VR experiences, and intention to use and purchase VR experiences (H1 & H2). In other words, mental health consciousness and perceived social interaction could be the variables

explaining the relationship between the perceived COVID-19 impact and acceptance TAM

variables (Attitude, Intention to Use, Intention to Purchase).

5.2. Significance of the Findings

With all my hypotheses, I examined how the perceived impact of COVID-19 relates to

the acceptance of VR experiences as a social interaction tool. Because my findings supported my

hypotheses, this data provides concurrent validity to previous studies on COVID-19. The results

support previous studies and reveal that health anxiety, financial worry, social support, and

loneliness are all significant contributors to VR acceptance.

Although previous studies have already shown that the perceived impact of COVID-19

positively affects attitudes toward and intentions to use VR experiences, there is still a need to

further identify the reasons for this relationship. Through H4 and H5, I examined how mental

health consciousness and perceived social interaction could be the variables explaining the

relationship between the perceived impact of COVID-19 and users' attitude and intention to use

or/and purchase VR. The pandemic has raised peoples' awareness of mental health

consciousness due to increased feelings of loneliness, anxiety, and fear as a result of safe-

practice quarantining and social isolation (Hwang et al., 2020). Many have reported feeling

lonely and socially displaced, yet also becoming more aware of how such conditions impact their

lives. Because of the increased awareness of mental health, the data showed that participants

responded positively to VR experiences that encourage social interaction and are open to

accepting VR experiences as a solution to one of the many life changes resulting from the

COVID-19 pandemic.

5.3. Theoretical Contributions and Practical Implications

The COVID-19 pandemic was shown as an influential external factor that significantly

predicted all the acceptance TAM variables. Furthermore, mental health consciousness and

perceived social interaction have a strong relationship to perceived COVID-19 impact. This relationship shows that individuals' perception and awareness towards mental health has changed due to a lack of social support and a heightened sense of loneliness, and people are willing to adopt new technology to stay connected with others. This research supports Huang's (in press) suggestion that concern for safety and health is a powerful motivator to adopt new technology. Furthermore, remaining remote for professional, social, spiritual, and other daily activities will be considered as an alternative even after the pandemic (Dickler, 2021). With this change of mindset and acceptance of behavior, people may see VR as a useful tool to connect socially, even after the COVID-19 pandemic.

VR has typically been marketed as an entertainment device and experience. Because the pandemic has impacted people's awareness of mental health and their desire for social interaction, people could be more open to adopting VR if it was marketed as a mental health support tool through social interaction. Such applications will be useful even after the pandemic subsides because of the convenience of connecting with others in an environment that provides a social presence without having to be there physically.

5.4. Limitations and Future Directions

First, this study examined a single social VR application. The application could have been a variable itself and could have influenced acceptance-related TAM variables. Future studies can focus on qualitative research to examine users' experiences with different VR applications and devices, emphasizing which variables are most beneficial to enhancing one's mental health when affected by social isolation. Additionally, studies can focus on how to implement VR experiences as a part of therapy.

This study is a cross-sectional survey design and used Amazon MTurk to gather participants from the United States. Although MTurk provides reliable data, there are limitations

to the participant pool (Difallah et al., 2018). There may be potential bias because all of the participants had access to the internet or chose to participate in this study because they were already interested in VR experiences. Also, because the participants were recruited during the pandemic, it may be difficult to replicate the study in the future due to the specific context that COVID-19 provided. However, when the height of the pandemic passes, it will be valuable to investigate how much COVID-19 has impacted people's overall social life and examine how VR experiences can meet their evolving needs.

6. Conclusion

There are three questions I wanted to explore, which have been answered by the data. Regarding the first research question introduced in this study, the COVID-19 pandemic has significantly impacted people's lives, particularly their mental health and social lives (Xiao et al., 2021). As VR devices and experiences are becoming more affordable and mainstream, the potential for VR usage to enhance one's mental health is also becoming more promising (Jerdan et al., 2018). Especially in this period of uncertainty and social isolation, people are looking for new ways to stay connected with others. Because VR experiences provide a safe option to remain socially connected with friends, families, and colleagues in an immersive environment, people are more open to adopting VR experiences to address the negative social impact of COVID-19.

Regarding the second and third questions, perceived usefulness and perceived ease of use are both powerful variables in terms of intent to adopt VR. Both variables need to be considered when creating VR experiences that provide immersive social interactions between users. Mental health consciousness and perceived social interaction directly influence PU and PEU.

Knowing that health consciousness is a powerful motivator to adopt new technology, we can use that factor to introduce VR to new users who are still unfamiliar with VR's purpose and

functions. We can continue to make VR accessible, useful, and helpful by enhancing mental

health benefits, even after the COVID-19 pandemic.

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Appendix

Appendix A: Survey Instrument

TAM (Questions 1-7)

(Q1) Perceived usefulness of socializing in virtual reality (VR) (1 = strongly disagree; 7 = strongly agree)

I believe using VR to socialize would help me be more effective. (1)

Using VR to socialize would be useful in my life. (2)

Using VR to socialize would improve my life. (3)

Using VR to socialize would enhance my effectiveness in life. (4)

(Q2) Perceived ease of use of socializing in virtual reality (VR) (1 = strongly disagree; 7 = strongly agree)

I believe using VR to socialize would be easy for me. (1)

I believe it would be easy to get this VR application to do what I want it to do. (2)

I believe using this VR application would be clear and understandable. (3)

I would find this VR application flexible to interact with. (4)

It would be easy for me to become skillful at using this VR application. (5)

(Q3) Intention to Use virtual reality (VR) to socialize (1 = strongly disagree; 7 = strongly agree)

There is a high likelihood that I will use VR to socialize within the foreseeable future. (1)

I intend to use VR to socialize within the foreseeable future. (2)

I will use VR to socialize within the foreseeable future. (3)

Using VR to socialize in the foreseeable future is important to me. (4)

I would use VR to socialize because it is entertaining. (5)

I would use VR to socialize because it is funny. (6)

I would use VR to socialize because it is exciting. (7)

(Q4) Intention to Purchase virtual reality (VR) hardware to socialize (1 = strongly disagree; 7 = strongly agree)

There is a high likelihood that I will purchase VR hardware within the foreseeable future. (1)

I intend to purchase VR hardware within the foreseeable future. (2)

I will purchase VR hardware within the foreseeable future. (3)

Purchasing VR hardware in the foreseeable future is important to me. (4)

(Q5) Attitude toward the VR Application (1 = strongly disagree; 7 = strongly agree)

Good (1)

Superior (2)

Pleasant (3)

Excellent (4)

Interesting (5)

Worthwhile (6)

Useful (7)

(Q6) Social Interaction (1 = strongly disagree; 7 = strongly agree)

I will use it more if it is possible to talk to someone on a virtual reality device. (1)

It would be better if I could use social network sites like Facebook on virtual reality devices. (2)

If I could share content with others on virtual reality devices, I would use them more. (3)

(Q7) Socializing (1 = strongly disagree; 7 = strongly agree)

I would use VR to get peer support from others. (1)

I would use VR to meet interesting people. (2)

I would use VR to meet interesting people. (3)

I would use VR to stay in touch with people I know. (4)

Impact of COVID-19 (Questions 8-13)
- (Q8) To what extent has the situation associated with COVID-19 affected the way you live your life? (scale of 1-7)
- (Q9) Are you changing any plans that you have made because of the coronavirus?
- (Q10) How much the pandemic impacts you in the following domains (scale of 1-7):
    - Health anxiety
    - Financial worry
    - Social support
    - Loneliness
- (Q11) During the past five months, how often were you exposed to news and information about COVID-19 on social media, such as Facebook and Twitter? (scale of 1-7)
- (Q12) On a scale of 1 to 7, how serious of a public health threat do you think the coronavirus is or might become?
- (Q13) On a scale of 1 to 7, how worried are you about getting the coronavirus?

(Q14) Personal Mental Health (1 = strongly disagree; 7 = strongly agree)

I have the impression that I sacrifice a lot for my health. (1)

I consider myself very health conscious. (2)

I think that I take health into account a lot in my life. (3)

I think it is important to know well how to stay healthy. (4)

My health is so valuable to me that I am prepared to sacrifice many things for it. (5)

I have the impression that other people pay more attention to their health than I do. (6)

I do not continually ask myself whether something is good for me. (7)

I often dwell on my health. (8)

Demographics (Questions 15-19)

(Q15) Sex

Male

Female

Non-binary/Third Gender

Prefer not to say

(Q16) Age

Under 18

18-24

25-34

35-44

45-54

55-64

65-74

75-84

85 or older

(Q17) Education

Less than high school

High school graduate

Some college

2 year degree

4 year degree

Professional degree

Doctorate

(Q18) Income

Less than $10,000

$10,000-$19,999

$20,000-$29,999

$30,000-$39,999

$40,000-$49,999

$50,000-$59,999

$60,000-$69,999

$70,000-$79,999

$80,000-$89,999

$90,000-$99,999

$100,000-$149,999

More than $150,000

(Q19) Race

White

Black or African American

American Indian or Alaska Native

Asian

Native Hawaiian or Pacific Islander

Other

Appendix B: VR Application Trailer

https://www.youtube.com/watch?v=c8XCEH_UHrA