

Does Cultural Communication Strategy in Metaverse affect International Students' Mental Health? Moderating effects of Cyberchondria and Healthcare Disparity

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ABSTRACT

The present study examined the mental health of international students through cultural communication strategy in the metaverse with the moderating effects of cyberchondria and healthcare disparity. The relevance of this research study can be made evident with the ongoing trends of today's world. In the present time, the concept of virtual reality in the metaverse has become one of the most important and debatable topics all around the globe. The concept of metaverse has led to the evolution of the Internet as a whole which can create direct impacts on the real world too. The target country of the current research is China. In order to gather information for the study, the researchers employed a questionnaire technique. A total of 335 surveys were sent out to Chinese medical students; 320 were deemed relevant for the study. In order to measure the variables using measurement scales, questionnaires are created using various items from the variables. The results obtained after analyzing the questionnaires indicated a significant relationship between cultural communication in the metaverse and the mental health of internal Chinese students from medical universities. The moderating impact of healthcare disparity was found to be significant and the cyberchondria entails an insignificant impact on the cultural communication in the metaverse and the mental health of students. The present study is found to be beneficial in promoting cultural communication between international students and local students for promoting the better exchange of cultural values. The 3D virtual environment used for conducting the present study has also helped in improving communication as well as interactions. However, from the present research study, it was concluded that cultural communication is essential for promoting the mental health of international students as this could be beneficial in obtaining skillful professionals for various businesses. The current study added novelty by focusing on cultural communication in the metaverse but it has prevented the study to focus on many essential aspects which are experienced by international students in the real world.



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1. Introduction

The mental health of students has become a concern of the international community. The world is highly culture-centric which shows that the process of communication in a cultural context has an increasing effect on the mental health of students at every level. The pandemic of COVID-19 has caused several educational institutes to rapidly switch from the conventional method of teaching which is based on the attendance of students to an online system of education which is conducted at a distance so that face-to-face interactions can be avoided for controlling the spread of this particular virus among people. Both synchronous and asynchronous methods of online education are being used based on the mode of delivery between teachers and students (Azorín, 2020; Rashid & Yadav, 2020; Zhu & Liu, 2020). These types of online learning methods come under the domain of 2D web-based virtual environments and different platforms such as Moodle, Blackboard, Zoom, Adobe Connect, and, VooV Meeting, etc. are being used for this purpose in different parts of the world (Moritz & Youn, 2022). This method of teaching allows the students and teachers for communicating with others in a flexible as well as affordable manner through which the students can be kept engaged with their studies. The students remain engaged with the help of interacting relationships with teachers through these platforms. These platforms are easily accessible by both teachers and students, therefore, these platforms are serving as alternatives to the physical and offline system of education. On the other hand, another concept of great importance has also been introduced throughout this world in the form of 3D based virtual environment by the metaverse (Schumacher, 2022). According to this concept, the users are capable of interacting with each other within a virtual space in the form of certain kinds of digital entities which are named avatars. In this process, such kind of technology is used which is multisensory and immersive and includes Extended Reality (XR), Virtual Reality (VR), Augmented Reality (AR), and Mixed Reality (MR) (Carbonell Carrera & Bermejo Asensio, 2017). The concept of the metaverse can be utilized and implemented in different fields including politics, economics, social sciences, cultural studies, and the field of education as well. The utilization of this technological advancement in the educational sector has been adopted in different countries and it has resulted in improving the online learning performance of the students to a greater extent (Dincelli & Yayla, 2022; Mazumdar, Sathvik, Chakraborty, Unhelkar, & Mahmoudi, 2024).

The relevance of this research study can be made evident with the ongoing trends of today's world. In the present time, the concept of virtual reality in the metaverse has become one of the most important and debatable topics all around the globe. The concept of metaverse has led to the evolution of the Internet as a whole which can create direct impacts on the real world also (Contreras, González, Fernández, & Martínez, 2022; Li, 2022). The Extended Reality (XR) can help in providing superior quality audio and spatial interaction through which the experience of students and teachers can be enhanced (Contreras et al., 2022). In this way, this technology will allow a higher level of immersion as the sound will be spatially distributed all around through which the attention of users can be grabbed effectively. It also assists in developing interactions with all virtual objects actively with the help of motion controllers and wearable devices. This kind of environment can aid in enhancing the educational experience of the students through which a strong and effective culture of learning can be fostered in which all the students will consider themselves inclusive and their self-perception will also get improved (Garavand & Aslani, 2022). The technology of the metaverse is growing in a significant manner as different such devices are being made available around the world. Similarly, the use of this technology is also being adopted by teachers for enhancing the experience of students regarding their process of learning. A micro-teaching environment can be created in the virtual world that is in resemblance to the natural teaching environment in which students and teachers can develop interactions among them with the help of the metaverse advanced technology (Hajian, Daneshgar, Sadeghi, Ojha, & Katiyar, 2024; Shen, 2022). The teachers take part in the virtual classrooms in the form of avatars thus facilitating the students in enhancing their capabilities of coping with the settings of a classroom environment. The teachers can also address the questions of students effectively thus leading to the creation of new ideas (Cai, Jiao, & Song, 2022).

Although online platforms have proved to be efficient alternatives for fulfilling the purpose of transferring knowledge to the students but still the quality of education is getting compromised extensively due to different reasons (Spangler, 2016). Inattention,

inactivity, emotional isolation, poor self-perception, etc have been some of the problems which are being reported among the students (Matthews, Lebowitz, Ottman, & Appelbaum, 2021). Moreover, there are some factors such as the use of mobile phones, etc due to which students get distracted at the time of their lecture being delivered via online platforms (Chaturvedi, Vishwakarma, & Singh, 2021; Spangler, 2016). These problems being faced by students then result in a low rate of course completion by various students and poor performance of students in their academic records as well. The motivation level of students also gets lowered while attending online classes because of not having the opportunity to participate in different tasks in an active manner (Chaturvedi et al., 2021). The actual emotions of both teachers and students cannot be expressed fully through these platforms but these kinds of problems can be alleviated with the help of introducing three dimensional (3D) environment for the students and teachers by the metaverse (Schumacher, 2022). Therefore, the present research study is aimed at analyzing the impact of the cultural communication strategy of the metaverse on the mental health of international students. Such technological entities of 3D concept by the metaverse assist in developing multiple interactions through the metaverse in a virtual world through which different issues related to the use of 2D learning platforms can be resolved.

That's why the researcher has thought of conducting this particular research study as the significance of the concept of the metaverse is undeniable in today's world where technology is getting advanced with every passing day.

The research objectives help in clearly understanding the scope of a particular study so that the different aspects of research can be understood in clear terms. Therefore, the research objectives for this study are as follows:

- To understand the relationship between Cultural Communication Strategy in Metaverse and Mental Health of International Medical Students.
- To study the moderating impact of Cyberchondria in the relationship between Cultural Communication Strategy in Metaverse and Mental Health of International Medical Students.
- To investigate the moderating impact of Healthcare Disparity in the relationship between Cultural Communication Strategy in the Metaverse and the Mental Health of International Medical Students.

Based on the research objectives of this study, the following research questions have been designed based on which the whole research will be conducted for addressing these questions:

- What is the relationship between Cultural Communication Strategy in Metaverse and Mental Health of International Medical Students?
- What is the role of Cyberchondria in modulating the link between Cultural Communication Strategy in the Metaverse and the Mental Health of International Medical Students?
- What is the role of Healthcare Disparity in influencing the relationship between Cultural Communication Strategy in Metaverse and the Mental Health of International Medical Students?

2. Literature Review and Hypotheses Development

2.1. Cultural Communication in the Metaverse

Nevelsteen (2018) says that the natural and virtual worlds are linked in a way that can't be broken, and the virtual world is everywhere in the real world. Things like daily life and the economy can continuously improve in the real world. Many studies comparing multiple ways of teaching international and national students have shown that cultural barriers are a massive issue for international students studying through Metaverse (Jeon, 2021). Several studies have examined the differences between Eastern and Western cultures in online education. The results are similar to studies examining these cultures in more traditional classroom settings (Brown, 2022). Chinese students were less critical and assertive in studying through Metaverse than American students (Koustriva, 2022). Similarly, cultural communication strategies for international students through Metaverse

are not unbiased sources of information (Sadykova & Meskill, 2019). The past things a student has done significantly affect how well they can talk, write, and understand. Students from other countries need to be mentally ready for the challenges of adapting to a new academic culture and learning to communicate through a medium (Metaverse) that is different from the norm and is often unreliable. Everyone knows that to do well in a class through Metaverse, international students must have a particular set of skills to handle cultural differences (Setyono & Widodo, 2019). They must be so committed to their studies that they keep studying even when teachers or other students aren't there because they get it hard for them to understand the cultural context so they need to make sure everything is completely clear for them. This shows that the student has the qualities that make an independent learner successful, such as initiative, commitment, and initiative.

2.2. Mental Health

The World Health Organization says that mental health is when a person has a positive view of their skills, can deal well with the demands of daily life, and makes a positive contribution to their community (Graber, 2019). These are the things that make up a healthy mind. To keep a student's mind in good shape, they need to believe not only in their worth but also in the worth of other cultured people. In the same way, they can experience joy, international students can also endure the heartbreak, despair, and disappointment unavoidable in living (Duan et al., 2020). International students come from many different places and have many different cultural traditions, racial backgrounds, and religious beliefs. When taking care of students' mental health, it's essential to be aware of the extra challenges they face when they move to a new country and start school at a new school. The way they feel can change a lot because of these changes. People will need to learn many new skills and ways of thinking to be successful in their new environments, especially if they are studying virtually. It is hard for them to understand their cultural communications. According to the research of Wiederhold and Giuseppe, if students don't know enough about how to use language, their academic performance could decline. International students usually have high hopes for their futures. If they don't come true, it can cause a lot of stress because of how much is at stake and how likely their families will help them financially (Roberts, Sharman, & Bowden-Jones, 2022). Changes in an international student's feelings, behaviors, or ways of thinking are clear signs that they have a mental health problem (or a mixture of these). According to Lokko, Chen, Parekh, and Stern (2016), problems with mental health are caused by problems at work, in social situations, or with family. It includes schizophrenia, bipolar disorder, schizoaffective disorder, obsessive-compulsive disorder, and borderline personality disorder.

2.3. Cyberchondria

Research shows that more people go to the Internet than any other place to learn about health issues (Zheng, Sin, Kim, & Theng, 2020). People from different countries, including China, were asked how they treated themselves based on what they found when they looked up their symptoms online. It can be hard to answer these kinds of questions. Jokic-Begic, Lauri Korajlija, and Mikac (2020) stated that cyberchondria is an excessive or repeated search for health-related information on the internet that is motivated by pain or worries about health but ends up making the pain or anxiety worse. Because cyberchondria, or doing too much health research on the internet, can take up a lot of time and make people feel helpless, it can cause them to ignore or put off tasks at home, work, or school. The person's relationships and social life suffer because of this (Laato, Islam, Islam, & Whelan, 2020). Cyberchondria has been linked to poorer performance, more worry, and a change in how students use health care (Starcevic, Schimmenti, Billieux, & Berle, 2021). Cyberphobic people are more likely to have health problems, trouble with ambiguity, and too much information. It is made worse by the fact that there seems to be an endless amount of information online. It may give a false sense of hope that one day a solid reason for troubling symptoms will be found. So, even though there is tension, it is easy to get lost in the search for information. Cyberchondria may get worse if a person spends a lot of time online trying to figure out confusing or contradictory health information. (McElroy & Shevlin, 2014).

2.4. Healthcare Disparity

Socioeconomic status factors like age, race/ethnicity, gender, level of education, and income of students have not been taken into account in most studies about the causes and effects of health disparities. Researchers have known for a long time that a student's social network has a big effect on how happy they are (Yan et al., 2022). Even though both problems affect older people more than younger people. The link between culture and health disparities has been mostly ignored in the majority of the studies. Even though older people are often the last to use new technologies such as Metaverse, It is still true. Most of the research on health disparities has been done in the West, while research done in developing countries hasn't added much to what is already known. It is because resources are easier to get to in the West. Even though virtual technology (Metaverse) is becoming more popular in developing countries (Cao & Wang, 2018). It is shown by the fact that one-fourth of the world's people live in China. In 2016, seven hundred and thirty-one million (53%) of China's 1.3 billion people had access to the internet. In recent years, the Chinese government has spent a lot of money on mobile medical devices that can connect to the internet (Fan, Wen, Jin, & Wang, 2013). Recent research shows that the Internet and mobile phones are essential for public health emergency response, surveillance of infectious diseases, teleconsultations, and distribution of interventions (Li, Yao, & Yin, 2018).

2.5. Theoretical Background

As society and culture is getting changed rapidly, one industry that is going through a lot of change is education. The General Theory of Cultural Diversity by Bruner (1996) says that a culture's or civilization's educational system is a big part of its way of life, not just a way to prepare for it. The theory states that a student's culture and where he/she (student) does study, are directly affected by cultural communications which ultimately creates problems for the mental health of medical students. The idea of "cultural capital" has been very hotly debated in the past few years. Bourdieu (1988) said that to have cultural capital, a person must be well-educated and culturally literate. It means that they (medical students) would be fluent in and comfortable with a wide range of languages and customs if they want to study in a new culture (Boddington, 2011). So, the future of any civilization depends on how much its people care about the arts as a form of cultural expression (Boddington, 2011).

2.6. Relationship between Cultural Communications through Metaverse on the Mental Health of International Medical Students

As the theory stated that international medical students are more likely to get depressed if they have trouble adapting to a new cultural conversation through the Metaverse (Han, Han, Luo, Jacobs, & Jean-Baptiste, 2013). The theory made it clear to the readers that medical students have to be well known about the culture in which they are trying to study through Metaverse. Communication and cultural barriers, loneliness (due to lack of friends), prejudice and stereotyping, a lack of social skills, and academic pressure all add to international medical students' stress levels (not good for their mental health). Even if only one of these diseases is present, bad mental effects like depression will be felt. Mental health problems like depression, anxiety, addiction, eating disorders, OCD, schizophrenia, PTSD, and agoraphobia don't usually cause problems for medical students who study virtually. Concerns and problems with the mental health of international medical students have a big effect on the value of international education due to cultural communicational barriers (Mellor, Carne, Shen, McCabe, & Wang, 2013). A survey found that thirteen percent of U.S. medical and doctoral students (from other cultures) and fifteen percent of U.S. undergraduates suffer from major depression or anxiety (Lian, Wallace, & Fullilove, 2020). A recent poll found that twenty-eight percent of international medical students in Lebanon are sad because they cannot understand properly their language. In Pakistan, nineteen percent of female medical students were depressed and forty-three were worried (Khalid, Qadir, Chan, & Schwannauer, 2019). Ratios were the same for both men and women. According to a study, low-income men who are depressed, anxious, smoke cigarettes, or have thoughts of suicide are more likely to hurt themselves. They stressed that cultural communication issue is a big part of the problem of loneliness and that they can happen in any civilization. International medical students have trouble speaking the

language, getting used to a new culture, and getting free academic help online (Chen, Akpanudo, & Hasler, 2020). However, the number of Chinese students in Thailand is on the rise, but academics say that this group is especially vulnerable because they can be replaced quickly (Chen et al., 2020).

H1: Cultural communication in the metaverse has a significant impact on mental health

2.7. Moderating Effect of Cyberchondria

Studies have reached the point that Cyberchondria has been linked to mental health caused by reading about health online (McElroy & Shevlin, 2014). International medical students who are very sensitive to the physical symptoms of anxiety (mental illness) are more likely to think that these symptoms mean they are in immediate danger, that something bad will happen, or that they will be hurt. Cultural communication issues and mental health of medical students who are studying through Metaverse may be affected by high anxiety sensitivity and health anxiety (Cyberchondria) (Selvi, Turan, Sayin, Boysan, & Kandeger, 2018). Cyberchondria is not that old, but its importance to public health has grown, especially among international medical students (Starcevic, Berle, Arnáez, Vismara, & Fineberg, 2020). Very less research has been done on Cyberchondria and mental health related to cultural barriers. However, researchers have looked at Cyberchondria as a risk factor for mental health (Te Poel, Baumgartner, Hartmann, & Tanis, 2016). Unfortunately, none of these studies have looked at all of these ideas in international medical students or any other group.

H2: Cyberchondria moderates the metaverse-cultural communication-mental health link.

2.8. Moderating Effect of Healthcare Disparity

People know that international medical students are aware of healthcare disparities and face specific problems with mental health care as being away from their own culture while studying virtually (Penner et al., 2013). Poor mental health has serious effects on the body, emotions, daily life, and culture of international medical students as they are from other cultural background where healthcare protocols are variant. According to a study conducted by specialists from a variety of professions, culturally appropriate integrative health care is essential for treating the whole spectrum of physical, mental, emotional, and behavioral disorders which would be difficult for international students as their countries would have different health disparities (Holden et al., 2014). A health gap between national and international medical students is a difference in health status, like malnutrition, that is caused by rising poverty rates. In the same way, no one can agree on what a healthcare deficit is. The researcher agrees that healthcare inequalities can be caused by different levels of access to qualified doctors, different insurance coverage, and clinical bias, among other things, but especially, cultural diversity causes a major issue in it (Walsh et al., 2016). But still, there isn't much research available on the broad range of variables.

H3: Health disparity moderates the relationship between cultural communication, the metaverse, and mental health.

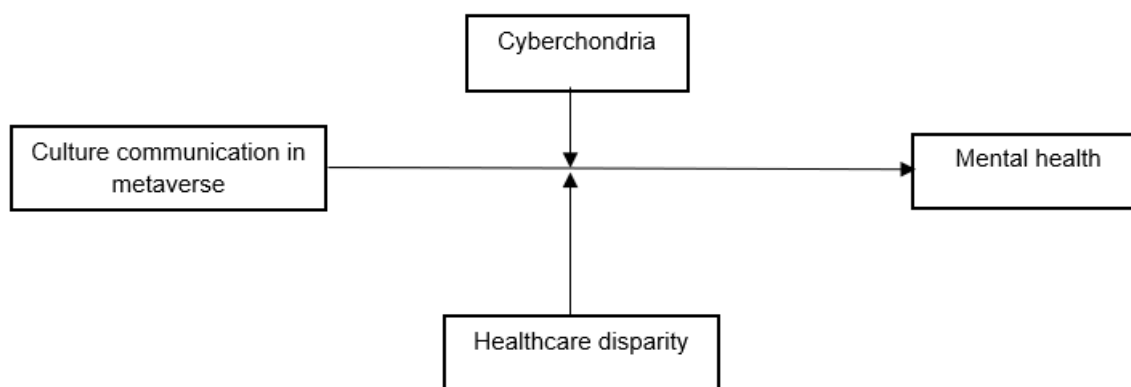


Figure 1: Theoretical Model

3. Methodology

The research method is based on quantitative studies that use an explanation-based technique. The research has conducted a questionnaire survey to get the outcomes. The target of the research is International medical students and the sector for study purposes is the Medical students from Chinese universities. SPSS and AMOS are used to extract the data for the results. Lastly, the study used different scaling measurements to measure the variables of the research. The research methodology is statistics-based, including sample, measurement of the variables, and the technique used to analyze the data. The research has used an explanatory approach that has expanded the existing variables' research domain. The study has also examined the relationship of variables in different dimensions using measurement scales. These scales are selected based on the number of items. The study also favors the assessment of the variables using a questionnaire survey. The data collected from the questionnaires is run into the SPSS and AMOS to ensure the accuracy of the findings. The researcher already defines the variables along with a linear relationship between cultural communication and mental health and the moderation of cyberchondria and health care disparity in the defined sector, i.e., Chinese medical students. The sample of Chinese medical students is analyzed to predict the impact of variables on international students' mental health. Therefore, the quantitative approach and the statistical representation of the research have helped to analyze the data.

3.1. Questionnaire designs

Cultural communication strategies play a crucial role in shaping the behavior and attitude of people. Similarly, mental health is also essential because solid mental health increases the capability and performance of the students. The methodology used for the research is a quantitative-based method. The specificity of the research is determined by the target population. The targeted population for the current research is the international medical students, and the sector in which the study has focused is the medical students from Chinese universities—the target country of the current research is China. The research has used the questionnaire technique to extract the data for the research purpose. A total of 335 questionnaires were issued to Chinese medical students, out of which 320 were deemed useful for the research. The questionnaires are created by incorporating several variable components, which aid in quantifying the variable using measurement scales.

Moreover, the purpose of the study is to find out whether cultural communication strategy in meta-verse affects international students' mental health. In addition, the research has also analyzed a moderating effect of cyberchondria and healthcare disparity faced by most medical students. The measurement scales of each variable are discussed below;

Table 1
Measurement Items

Variables	No. of items	Measurement scale	Reference
Culture communication	Five	1-5	(Wardhani & Kartikawangi, 2019)
Mental health	Five	1-5	(Irfan, 2016)
Cyberchondria	Five	1-5	(Jokic-Begic et al., 2020)
Healthcare disparity	Five	1-5	(Braveman, 2006)

Culture Communication

Wardhani and Kartikawangi (2019) have used a five-item scale to measure cultural communication. These items are identity, communication, reputation, culture, and image. The items are analyzed using an organizational setup where different cultural communication strategies are used. Furthermore, the items serve as the conceptual framework for the research, encompassing literature, in order to enhance the existing body of knowledge on the issue. These five items are examined under the domain of organizational culture, company image, and strategic vision. These are the levels for the items to be analyzed following the ongoing situation.

Mental Health

The scale adopted for the measurement of mental health is from Irfan (2016). The research has used five numbers of items including, demographic information, The mentioned scales include the Rosenberg self-esteem scale, the mental health continuum, the extraversion vs introversion scale, and the peer connection scale. Each item is studied using the quantitative method and combined to interpret the results. Each of the items represents a different variable dimension, which helps the researcher develop accurate results.

Cyberchondria

The cyberchondria scale is derived from the research conducted by Jokic-Begic et al. (2020). The current state of cyberchondria has been analyzed and measured using a scale consisting of five items. The items may include, age, education, number of children, and chronic health condition. All the mentioned items are analyzed and measured as demographic factors during the covid-19 times. The research inspects the items during the first and second waves. Furthermore, the number of items for the measurement during the first and second waves differs. The first wave has six numbers of items and the second wave has nine numbers of items which are combined in general five items for the current research.

Healthcare Disparity

Braveman (2006) has measured the healthcare disparity. The research has used that scale to measure the healthcare disparity. The study used five numbers of items to examine the variable. The items include cost impact, health outcomes, governance/leadership, communication/language assistance, and improvement/accountability. All these items have helped the researcher to analyze the healthcare disparity. Each item is studied in a different dimension. The impact of the items is studied and analyzed to predict the disparity in healthcare, particularly among the students in assessing their mental health. The items are also analyzed to propose future recommendations for implementing and enhancing the healthcare system for the mental well-being of overseas students.

3.2. Data collection process

The variables of the research are used to extract the results of the research. The research has used different items of the variables to study their relationship. The research consists of the individual effect of the variables and their linear relationship along with the moderating effect of the variables. The study examines the relationship between cultural communication strategy in meta-verse and international students' mental health, explicitly considering Chinese students as a sample. Furthermore, the paper also analyzes the moderating effect of cyberchondria and health care disparity in the relationship between cultural communication and mental health. Hence the variable has been studied using five items with the quantitative approach in the form of statistics and figures that lead the research to the conclusion.

Along with the research requirements, there are some barriers that the researcher has faced and adopted strategies to overcome to attain accurate results. The first issue faced is the sample size. Most of the researchers lack knowledge about the sample size, creating an error in the results. The sample size has been fixed, i.e., 335, and the margin for empty questionnaires was also defined. Three hundred twenty complete questionnaires were submitted that were helpful and utilized to analyze and get the results. The sample size selected by the researcher is standard and helped in obtaining accurate results.

Furthermore, the question of time has been addressed by employing a cross-sectional temporal horizon. To mitigate potential challenges in data collecting, the research was undertaken utilizing a cross-sectional time frame instead of a longitudinal study. Furthermore, the questionnaires are developed using scales with an accurate number of items. The literature and past studies are taken care to define the variables and the relationship among them. Thus, all the measures are taken into consideration. The research

is conducted with all possible preventive measures. The results of the research are ensured to be accurate.

4. Findings

4.1. Respondent's characteristics

This research has been carried out by specifically focusing on overseas medical students enrolled in Chinese universities. A total of 335 questionnaires were issued to Chinese medical students, with 320 of them being deemed useful for the research. The participants were affiliated with Chinese medical universities and were initially provided with comprehensive information about the objective and concept of this research. The answer was really grateful as the pupils shown a significant level of cooperation. The students were assessed based on their varying levels of medical expertise and qualifications. A total of 320 questionnaires were employed in the study. 77.8% of the participants were female students, whereas 22.2% were male students. Upon analyzing the questionnaires, it was discovered that there were 120 students who were in their second year of medical school. The second category of 54 students falls in the 3rd-4th year of their medical education. Whereas the most senior students were 146 who were at the edge of completing their degree of medical education. The student's response regarding the effect of cultural communication in the metaverse and its influence on mental health was recorded by taking into consideration the moderating impact of cyberchondria and healthcare disparity.

4.2. Measurement results: Cross-loading tests

The tests of the rotated component matrix provide the researcher with information on the validity of the survey. It means to aware the researcher that the items that appeared in questionnaires were not appearing in the context or meaning of cross-loading. Table 2 gives details regarding the items of the questionnaires.

Table 2
Rotated Component Matrix

	Component	
CCM1	.847	
CCM2	.834	
CCM3	.812	
CCM4	.824	
CCM5	.813	
C1		.780
C2		.891
C3		.791
C4		.892
C5		.733
HD1	.826	
HD2	.804	
HD3	.891	
HD4	.890	
HD5	.813	
MH1	.759	
MH2	.940	
MH3	.927	
MH4	.931	
MH5	.940	

CCM=Culture communication in Metaverse, C=Cyberchondria, HD=Healthcare disparity, MH=Mental health

The table indicated that each item was found in its corresponding column, and there was no evidence of items appearing in multiple columns, which suggests that there was no cross-loading noticed in the appearance of questionnaire constructs. The variables related to cultural communication in the metaverse, cyberchondria, mental health, and healthcare disparity have specific items listed in their respective column. This allows the researcher to ensure that there is no overlap or confusion in the data collected from questionnaires

pertaining to these constructs. The values derived from the rotated component matrix exceeded 0.7, indicating that

4.3. Descriptive Results

Descriptive statistics is useful for many sound reasons while conducting research. The core and utmost important benefit of descriptive analysis are that it ensures the core information about the presence of variables in the sets of data. The level of association among various constructs can also be assessed through descriptive statistics. In table 3, a summary of statistics explaining the quantitative features from a gathering of knowledge has been explained about this study. In the descriptive statistics, the mean, standard deviation, and skewness numbers stand out. The averages for CCM, C, HD, and MH are very close to or equal to 3. The fact that the skewness threshold number is also between -1 and +1 shows that the data is normal. It is clear from Table 2 that the skewness values are within the range of the given numbers. This means that the data is normal and there are no outliers.

Table 3
Descriptive of studied constructs

	N	Minimum	Maximum	Mean	Std. Deviation	Skewness	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error
CCM	320	1.00	5.00	3.1435	1.23683	-.141	.105
C	320	1.00	5.00	2.9993	.72433	-.331	.105
HD	320	1.20	5.00	3.0985	.55921	-.069	.105
MH	320	1.00	5.00	3.2299	1.15654	-.252	.105
Valid (listwise)	N 320						

CCM=Culture communication in Metaverse, C=Cyberchondria, HD=Healthcare disparity, MH=Mental health

4.4. Validity Results

An essential component of every research is the measurement of validity. It has been noted that research loses significance when its validity is low or nonexistent. Discriminant validity and convergent validity are used in the relevant research to measure the validity results and make sure the data is accurate and fit for replication. The measurements of variables that shouldn't be linked or related conceptually to one another are discovered to be precisely uncorrelated, as Table 4 explains the discriminant validity of variables. Discriminant validity for culture communication in the metaverse has a value of 0.878, bolded, which sets it apart from MH, C, and HD. The MH value of 0.807 differs from cyberchondria by 0.517 and from healthcare disparity by 0.533. Cyberchondria has a value of 0.912, which is different than healthcare disparity's 0.809. Healthcare disparity has a discriminant validity of 0.818, which sets it apart from itself. On the other hand, the novel scale's convergent validity in table 3 indicates how closely it is related to other variables and other measures of the same construct.

Table 4
Discriminant and Convergent Validity

	CR	AVE	MSV	CCM	MH	C	HD
CCM	0.891	0.681	0.320	0.878			
MH	0.922	0.774	0.334	0.865	0.807		
C	0.901	0.800	0.310	0.610	0.517	0.912	
HD	0.833	0.643	0.305	0.501	0.533	0.809	0.818

CCM=Culture communication in Metaverse, C=Cyberchondria, HD=Healthcare disparity, MH=Mental health

The findings of the discriminant and convergent validity tests are presented in Table 4. According to discriminant validity, there is no connection between variables that do not have any theoretical relationship. Cultural communication in the metaverse has a discriminant validity value of 0.878, which is different from all the other variables. Similarly, the variables MH, C, and HD have discriminant validity values of 0.807, 0.912, and 0.818, respectively, which means that the variables in question are discriminantly valid. The last variable of healthcare disparity is 0.818 distinct from itself. Table 4 also reports convergent

validities that are measured in terms of composite reliability and average variance extract. These two aspects of convergent validity must have authentic threshold values of greater than 0.05, so all the values of concerned variables such as CCM, MH, C, and HD ensure convergent validity in them. The average variance extracted AVE is a measurement of the variance amount that is recorded by a variable in link to the variance level because of the error of measurement. The calculated AVE for CCM, C, HD, and MH has been reported to be 0.681, 0.774, 0.800, and 0.643 respectively. The composite reliability was reported to be 0.891, 0.922, 0.901, and 0.833 respectively. The values of composite reliability thus ensure the internal consistency in the scale items of these variables. No items were released, and there were no hurdles with AVE in the data set. The output figures of the complete convergent validity investigation, as shown in Table 3, illustrates that the measurement model of our data set fulfills all the necessities for convergent validity. Therefore, convergent validity was decisively formulated for this study, and we moved toward the next step of tests.

4.5. Model Fitness

Model fitness is a contemporary way to determine the accuracy of the concerned and formulated hypothesized model. It is a specific way to determine factor analysis, mostly preferred tool while performing business research that use to investigate the measures of variables that are persistent with the consideration and understanding of the researcher concerning the nature of that variable.

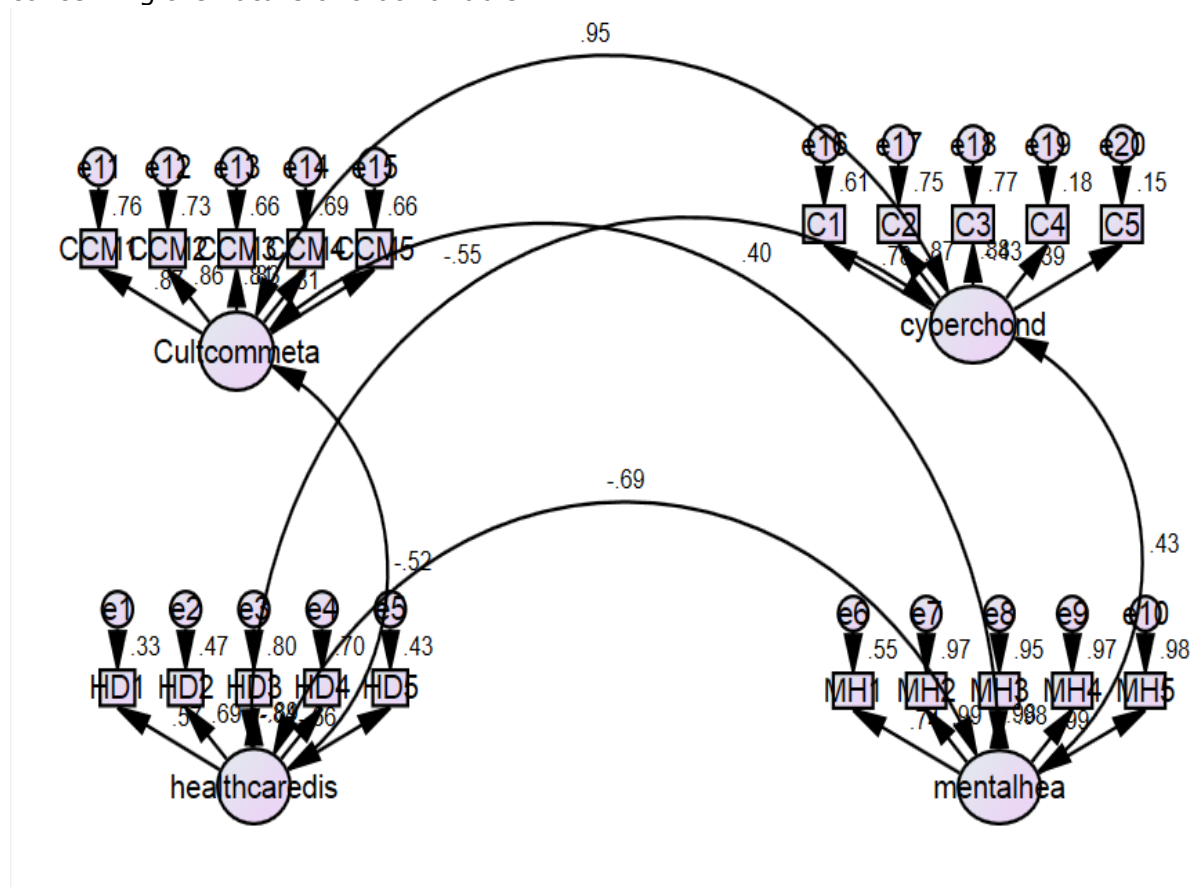


Figure 2: CFA

Table 5
Confirmatory Factor Analysis

CFA Indicators	CMIN/DF	GFI	IFI	CFI	RMSEA
Threshold Value	≤ 3	≥ 0.80	≥ 0.90	≥ 0.90	≤ 0.08
Observed Value	1.499	0.829	0.918	0.900	0.087

Table 5 provides an explanation of the research's model fitness. The study's model fitness was determined using confirmatory factor analysis, and the standard or threshold figures for CFI, GFI, RMSEA, and IFI have been previously stated with a tabular elaboration

of the values obtained during analysis. All of the values fell within the exact range of the threshold. The indicators have been measured and reported as follows: GFI = 0.829, IFI = 0.918, CFI = 0.900, and RMSEA = 0.087. The validity and trustworthiness of the proposed model were further substantiated by Figure 2. Their relationship, rather than their status, was the focus of the explored model, as shown in the figure.

4.6. Structure Equation modeling

An important and useful method for determining the outcomes of direct and indirect impacts of various interactions is structural equation modeling. The probability value plays a great role in this regard. So, while reporting the results of structural equation modeling, a p-value is considered as a core figure to finalize the status of the hypothesis formed in the concerned research.

Table 6
SEM Results

Effects	Hypothesized Path	B	S.E	P value	Conclusion
<u>Direct Effects</u>					
Hypothesis 1	CCM→ MH	.145	.055	0.02	Accepted
<u>Moderation Effects</u>					
Hypothesis 2	CCM*C→ MH	.24	.053	0.98	Rejected
Hypothesis 3	CCM*HD→MH	.179	.072	.002	Accepted

CCM=Culture communication in Metaverse, C=Cyberchondria, HD=Healthcare disparity, MH=Mental health

The first hypothesis is "culture communication in the metaverse is positively related to mental health" The hypothesis is accepted as the probability value is less than 0.05. Moreover, many researchers have previously studied this linkage and reported the positive and significant association between the two variables. And the results also reported the impact of cultural communication in metaverse on the mental health (CCM→MH, $\beta = .145$ and $p=0.002$). So, it can be concluded that with an increase in cultural communication in the metaverse, a positive impact **on** the mental health of international medical students of Chinese universities can be obtained.

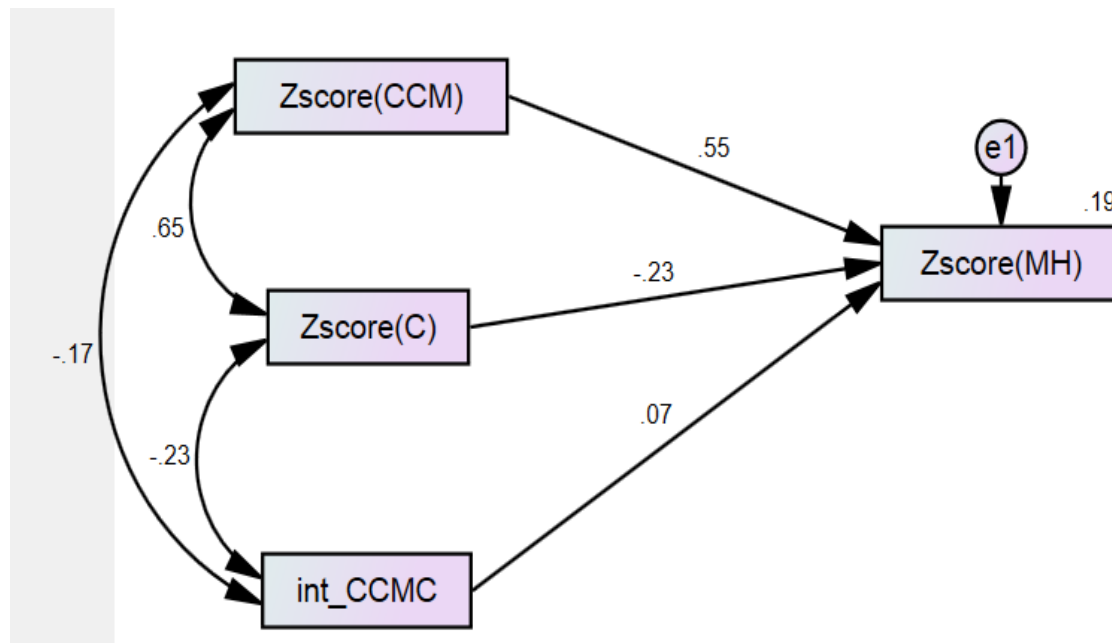


Figure 3: SEM

Second, cyberchondria may have a moderating effect on the mental health of overseas medical students studying in China and on their ability to communicate across cultures in the metaverse. This hypothesis is rejected as the SEM results showed a weak impact of Cyberchondria’s moderation between the dependent and independent variables. (CCM*C→MH, $\beta = 0.24$ and $p=0.98$). The figure below also supports through the graphical representation that two lines in red and blue are almost parallel to each other and do not expect to intersect with one another. So, in contemporary research these days, through this

graphical moderation, the status of significant or insignificant moderators can be analyzed. The hypothesis was thus found to be insignificant and thus rejected through the results of structural equation modeling.

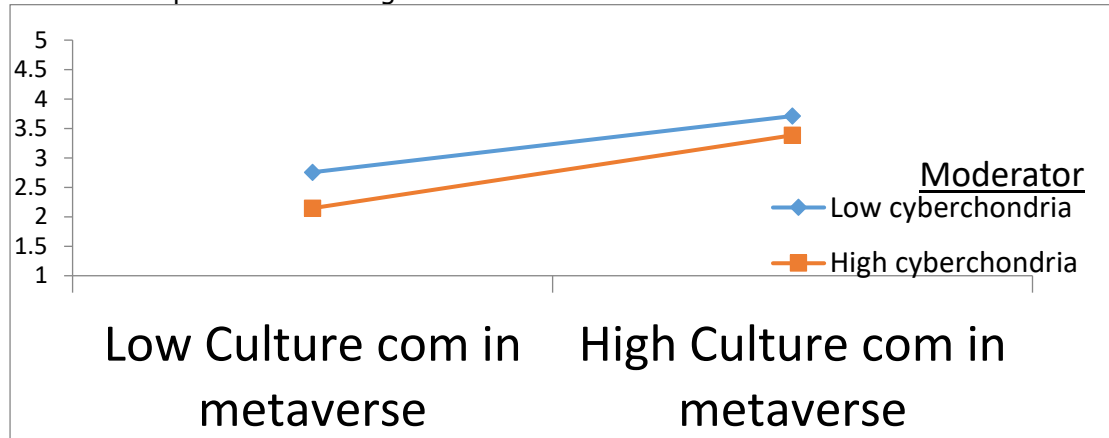


Figure 4: Cyberchondria moderation

Finally, we postulate that healthcare inequity moderates the relationship between cultural communication in the metaverse and psychological well-being. The results show that an individual's access to healthcare has a substantial moderating effect on the correlation between metaverse cultural communication and psychological well-being (CCM*HD→MH, $\beta = -0.179$ and $p = .002$). The results of the p-value in this case also supported the significance of this moderator being less than 0.05. The following graphical figure shows that the two lines intersect each other indicating healthcare disparity is a significant moderator between cultural communication in the metaverse and mental health.

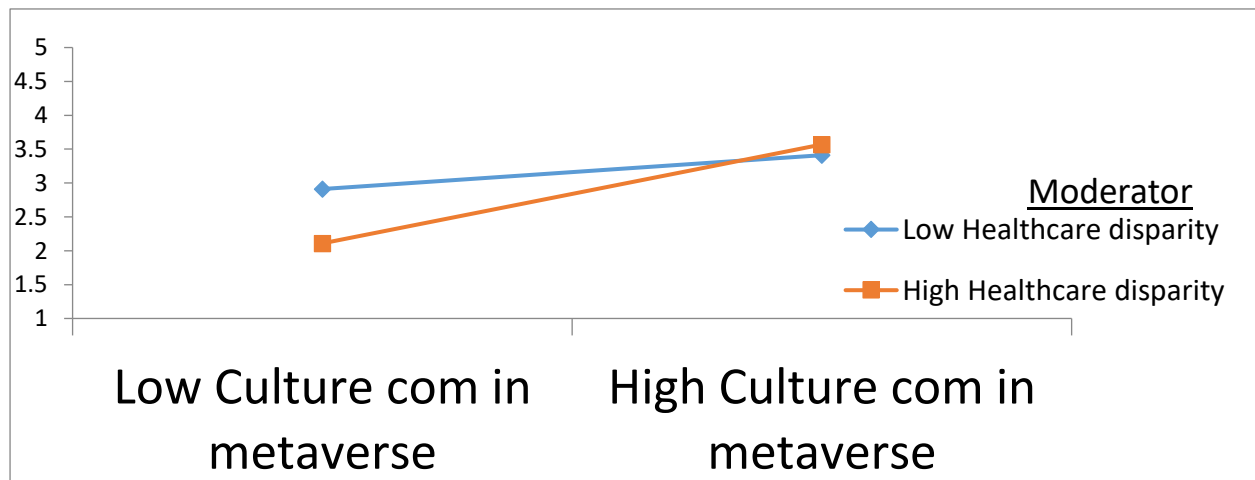


Figure 5: Healthcare Disparity Moderation

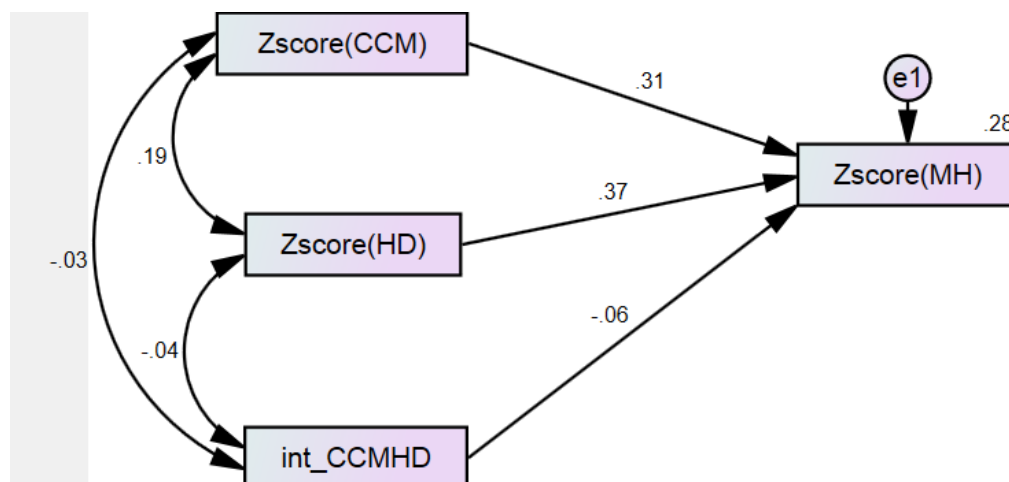


Figure 6: Healthcare Disparity Moderation

Although results also supported the importance of healthcare disparity through previous studies that it has been proved to be a momentous moderator. Its existence, however, strengthens the cultural communication in the metaverse and the mental health of international medical students from Chinese universities. Figure 5 explains the interaction impact of CCM and HD on mental health illustrated as follows above.

4.7. Discussion

In the context of international students, cultural communication has long been a focus of consideration for numerous experts. They believe that as people all around the world have diverse cultural norms and values, communication is key to effectively sharing these things. Additionally, it is discovered that several elements, like cyberchondria and healthcare inequity, play significant roles in this context. The purpose of this quantitative study was to test three fundamental hypotheses about the impact of cross-cultural communication in the metaverse on the psychological well-being of overseas medical students attending institutions in China. The primary objective of this research was to test the hypothesis that overseas medical students studying at Chinese universities would have better mental health if they were able to communicate across cultural boundaries in the metaverse. Additionally, this study's results demonstrated that cross-cultural contact in the metaverse significantly affects the psychological well-being of foreign medical students attending Chinese institutions. Nevertheless, it is indisputable that cultural origins play a significant role in creating a more conducive learning environment, as it has shown successful in enhancing individuals' social skills (Zhou & Liu, 2021). Many past studies have also contributed to the understanding of cultural communication in promoting the mental health of students (Zhao, 2022). This is also found to be effective in promoting cultural identities. Even though international students have to face various challenges while studying in a host country, cultural communication could help provide them with equal opportunities and ensure them an effective learning environment (Gilmore et al., 2022). Such practices are also found to be beneficial in promoting respect among the pupils as well as the teachers. Thus, the results of the present study support the findings of (Sanchez, Adams, Arango, & Flannigan, 2018), which stated the importance of cultural communication in preventing any offense or miscommunication between international students and other stakeholders of the educational sector, ensuring their healthy state of mind.

The second hypothesis of the current study was to determine the moderating impact of cyberchondria in this context. Thus, cyberchondria was found to have a negligible moderating effect on the correlation between cross-cultural communication in the metaverse and the psychological well-being of overseas medical students attending Chinese institutions. Cyberchondria and internet addiction are emerging issues worldwide (Uysal Toraman, Kalkim, & Korkmaz, 2022). According to different scholars, cyberchondria results in self-misdiagnosis as well as exaggerating anxiety related to one's health. This is found to be negatively impacting the mental health of the international students making them more sensitive to the changes. (Toraman, Kalkim, & Korkmaz, 2022) observed that health anxiety is increased among international students as a result of cyberchondria. This has prevented many students from performing their best. Abuse symptoms are also observed among individuals who are addicted to the internet. A systemic review was presented by (Vismara et al., 2020) in the context of cyberchondria which showed its significant impact in enhancing distress as well as health anxiety and also obsessive-compulsive behaviors. Therefore, the online search for medical information is found to be irresistible (Avçin & Can, 2021). However, various other studies conducted in the past have also supported the results of the present study stating that cyberchondria has a significant impact on mental health (Aker & Aiken, 2021; Msc & Tunçay, 2021).

The present study tested three hypotheses, the last of which was that healthcare disparity moderates the relationship between cultural communication in the metaverse and the mental health of international medical students in Chinese universities. The results demonstrated that this hypothesis was significantly true. Healthcare disparities are the various clinical outcomes of individuals due to the ethnic affiliation of the population (Arday, 2018). Various factors are also found to contribute to this context which includes age, sexual orientation, gender, disability, socioeconomic status as well as religion. Research has shown international students experience increased stress levels due to lifestyle changes,

increased workload as well as responsibilities, and also interpersonal relationships (Shepherd, Willis-Esqueda, Newton, Sivasubramaniam, & Paradies, 2019). However, no medical attention, as well as coping strategies, are promoted for international students, which has led to various negative consequences. The scholars are of the view that the stressors experienced by students of color often remain untreated in comparison to white students (Brottman, Char, Hattori, Heeb, & Taff, 2020). Clear bias is observed in such situations. The findings of such studies are found to align with the results of the present study, and thus, the international students are often unaware of the nationalized healthcare system of the host country, so proper training sessions are needed to be promoted to overcome this issue. The role of healthcare practitioners is needed to be stabilized in this case.

5. Conclusion

As a result of increasing mass migration, the world is largely becoming heterogeneous. Many people migrate because of various reasons, such as to get a better education, employment, residency, and others. This has also helped in promoting cultural integration. Culture shows the behavioral patterns which impact a society's lifestyle. Many countries at present are found to be promoting the exchange of cultural values. International students are found to be essential in this process as they help in exchanging cultural norms as well as values. China being one of the largest countries in the world in the context of both area as well as population, is also promoting cultural communication between individuals from various cultural backgrounds. Many universities in China are offering student exchange programs for effective outcomes. The mental health of international students is also a point of consideration by many universities worldwide. This has encouraged the governments as well to develop and implement policies for providing equal opportunities to international students without considering any health disparities. However, with time, the metaverse has become an easy approach for various researchers to conduct various studies, so the present study was also conducted in such a setting.

The purpose of this quantitative study was to examine how cultural communication in the metaverse affects the mental health of international medical students. The study also explored the moderating effects of cyberchondria and healthcare disparities in the context of Chinese universities. The results of this study indicate that cultural communication in the metaverse has a beneficial impact on the mental well-being of international students. However, cyberchondria plays a negligible role in moderating the relationship between cultural communication in the metaverse and the mental health of international students. Nevertheless, the major impact of healthcare disparity as a moderator was discovered in this particular situation. The current study is advantageous in facilitating cultural communication between international students and local students to enhance the sharing of cultural values. The utilization of a 3D virtual environment in the current study has facilitated the enhancement of communication and interactions. Nevertheless, the current research study indicated that cultural communication is crucial for enhancing the mental well-being of international students, as it can contribute to the acquisition of highly skilled people for diverse industries.

5.1. Implications

5.1.1. Theoretical Implications

In the current study, a multi-dimensional conceptual framework is formed and analyzed in order to connect the emerging concepts of cultural communication in mental health through metaverse, and moderating effects of cyberchondria and health care disparity on the cultural communication and mental health. By doing so, the research allows the further researchers to integrate cross-disciplinary subjects like technology, psychology, information sciences, and healthcare subjects. Thus, the present study will not only be beneficial for social sciences but several other fields of studies as well. It will open horizons of research and development for all these disciplines. Moreover, the study is supported by several theories and studies like the self-determination theory, technology-acceptance model, and cognitive theory. By employing all these theories, the study is supporting and proving evidence to practically and theoretically support these theories and act as evidence in their favor. Mental health is gaining more and more importance recently. The ways inw

which mental health can be improved through cultural communication in multi cultural societies is very significant. The current study, adds to the existing literature on the cultural communication and mental health, therefore, it is significant. The influence of cultural communication in the metaverse on the mental health of international students has been focused on in the current study, which has helped in improving the literature review in this regard. This could be effective in determining various challenges faced by international students to adapt to the changing environment as well as to integrate socially. The relationships between variables of the present study were discussed in the context of the "General Theory of Cultural Diversity," which also contributed to the literature of this theory. Moreover, various health disparities based on age, gender, and cultural backgrounds have also been discussed in the current study to understand their contribution to the mental health of an individual and to take important actions accordingly. The discussion related to cultural communication in the metaverse has also been effective in understanding the importance of various digital technologies in this regard. As almost no study has focused on cultural communication in the metaverse, the current study is found to be beneficial in this context. As it will provide theoretical guidance for further research on mental health through metaverse.

5.1.2. Practical Implications

The current quantitative study is found to have effective practical implications, especially for the benefit of international students. A better understanding of cultural communication might help various universities to offer easy communication means for international students to blend in. It has also encouraged the universities to offer more student exchange programs to promote diversity which could lead to globalization. This helps in developing skillful as well as capable professionals for various companies without any discrimination. This would help the world to become a better place, and the exchange of cultures increases respect for one another. However, international students are the key aspect in this regard. The increased discussions in classrooms are also encouraged to improve the exchange of norms as well as values among the students. Various international universities have taken initiatives to introduce a quota of international students in various departments every year to provide an equal chance to every individual without letting any sort of discrimination in the way. This is found to be effective for continuous progress in various fields of work worldwide. These practices are found to be significant not only socially but also economically as well as financially for countries around the globe.

5.2. Limitations and Future Research

Several limitations have been identified in the current investigation for a variety of reasons. An identified constraint of the current investigation was the limited time and resources available. This elucidates the cross-sectional nature of the study. In order to further investigate this matter, it would be beneficial to conduct additional longitudinal research in the future. In addition, the study employed a quantitative technique, which resulted in a restricted sample size and a lack of in-depth understanding of the respondents' beliefs. In future research, the qualitative analysis could be specifically directed towards comprehending the respondents' concepts in a thorough manner. Another noted constraint was the reliance on data acquired exclusively from overseas medical students studying at Chinese universities, which was facilitated by their easy accessibility. For future studies, the present study could be conducted in the context of other countries to obtain effective outcomes. The current study added novelty by focusing on cultural communication in the metaverse but it has prevented the study to focus on many essential aspects which are experienced by international students in the real world. This could encourage future studies to focus more on cultural communication in the real world to determine the important factors in this context.

Authors Contribution

Muhammad Nouman Shafiq: Complete the initial and final revised draft.

Conflict of Interests/Disclosures

The authors declared no potential conflicts of interest w.r.t the research, authorship and/or publication of this article.

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